@RomainRouvoy

SPIRALS

Inria
INVENTORS FOR THE DIGITAL WORLD

Université de Lille 1
SCIENCES ET TECHNOLOGIES

CRIStAL
Centre de Recherche en Informatique, Signal et Automatique de Lille


1h20
London
2h40
Amsterdam
Canterbury
Brighton
Utrecht
Rotterdam
Dunkerque
Anvers
Gent
2h21
Köln
Calais
0h38
Boulogne
Brussels
Lens
Lille
Courtrai
Leuven
Douai
Arras
Cambrai
Liège
Charleroi
Valenciennes
Maubeuge
Amiens
Luxembourg
Rouen
Reims
Strasbourg
Paris
1h00

team.inria.fr

SPIRALS

Spirals

Self-adaptation for distributed services and large software systems

Home | Members | Publications | Software | Fundings | Contact | Intranet

Presentation

Spirals is conducting research activities in the domains of distributed systems and software engineering.

Spirals aims at introducing more automation in the adaptation mechanisms of software systems, in particular, transitioning from adaptive systems to **self-adaptive systems**. Spirals targets especially two properties: **self-healing** and **self-optimization**. With self-healing, Spirals aims at studying and tailoring data mining and machine learning solutions for the design and implementation of software systems. This contributes to the goal of obtaining solutions for automatic software repair. With self-optimization, Spirals aims at sharing, collecting, and analyzing distributed behaviors and data to continuously tailor, optimize, and keep under working conditions software systems. This participates to the goal of obtaining eternal distributed systems.

Spirals is a joint project-team between Inria and the University of Lille – Sciences and Technologies within UMR 9189 CRIStAL. Spirals originates from the ADAM project-team (2008-13).

Available Positions

- PhD & Internship

Privacy-aware data dissemination in mobile networks

Cartography of the Quality of Experience for Mobile Internet Access

- R&D Engineer

Développeur applications mobiles pour plate-forme de géolocalisation indoor

Research Software Engineer in Automatic Repair

Links

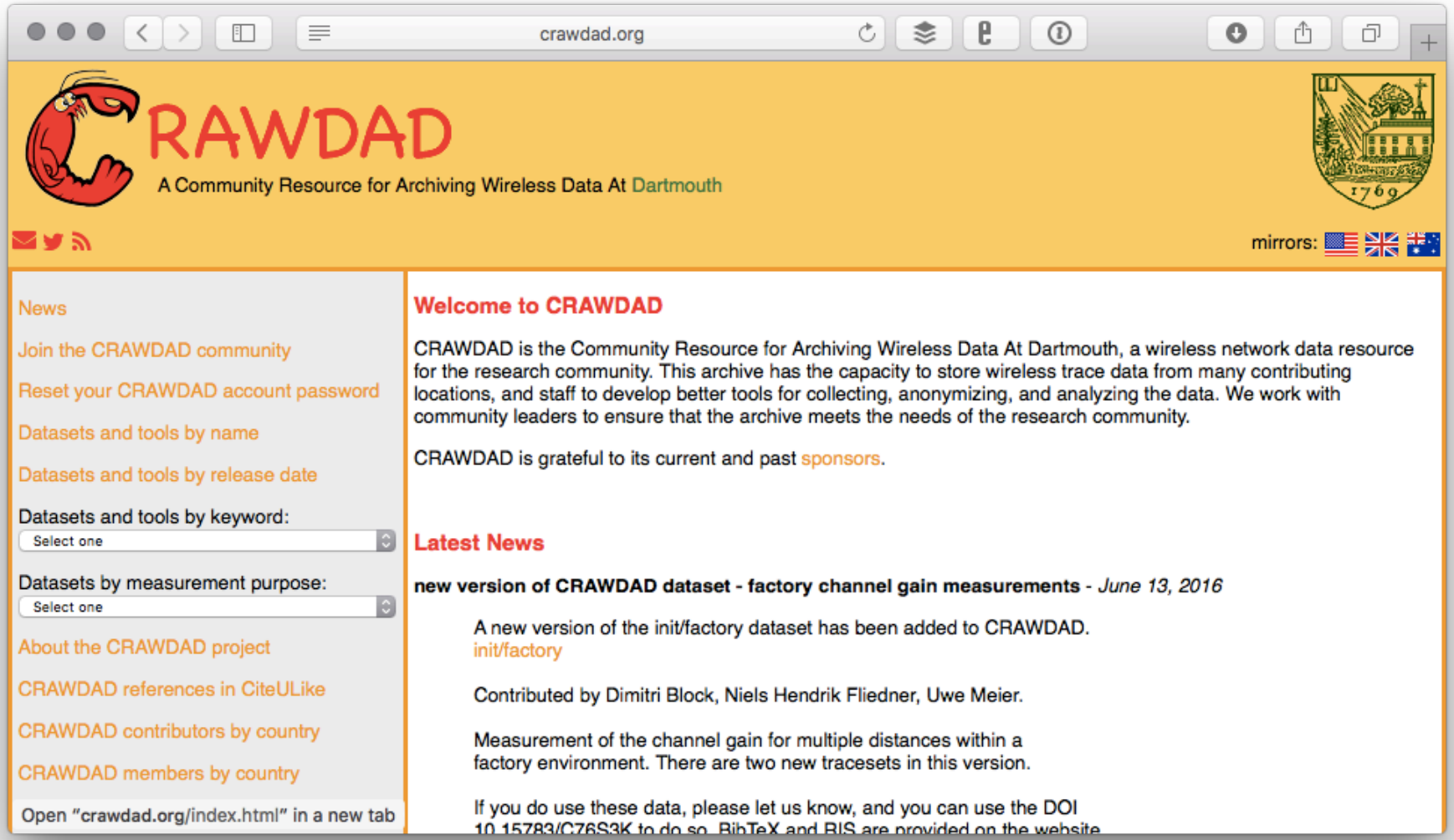
- Software Engineering seminar
- Somca Inria associated team
- Videos

Spirals Twitter

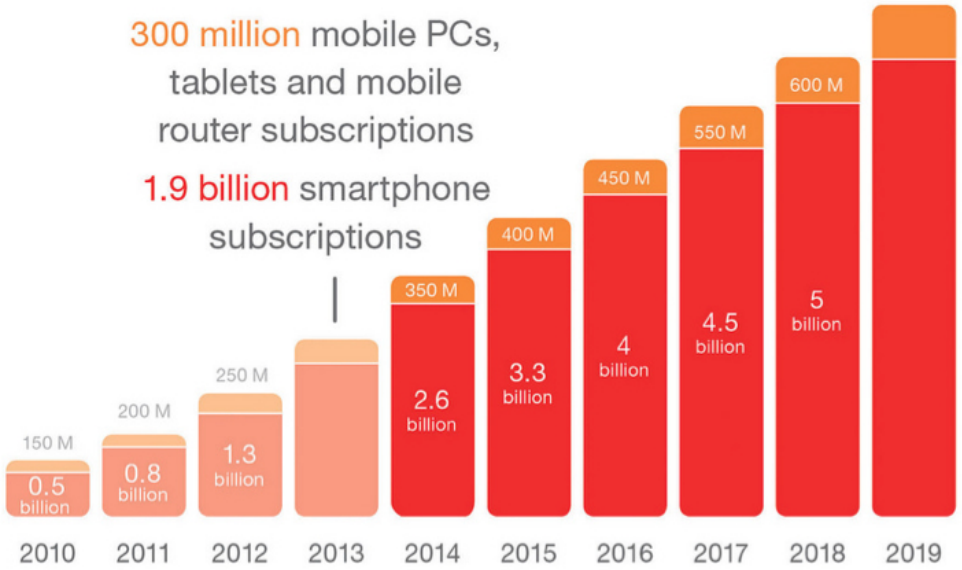
Tweets by @SpiralsTeam

Spirals Team Retweeted

IEEE Software
@ieeesoftware


crawdad.org
CRAWDAD
A Community Resource for Archiving Wireless Data At Dartmouth
1769
mirrors:
News
Join the CRAWDAD community
Reset your CRAWDAD account password
Datasets and tools by name
Datasets and tools by release date
Datasets and tools by keyword:
Select one
Datasets by measurement purpose:
Select one
About the CRAWDAD project
CRAWDAD references in CiteULike
CRAWDAD contributors by country
CRAWDAD members by country
Open "crawdad.org/index.html" in a new tab
Welcome to CRAWDAD
CRAWDAD is the Community Resource for Archiving Wireless Data At Dartmouth, a wireless network data resource for the research community. This archive has the capacity to store wireless trace data from many contributing locations, and staff to develop better tools for collecting, anonymizing, and analyzing the data. We work with community leaders to ensure that the archive meets the needs of the research community.
CRAWDAD is grateful to its current and past sponsors.
Latest News
new version of CRAWDAD dataset - factory channel gain measurements - June 13, 2016
A new version of the init/factory dataset has been added to CRAWDAD.
init/factory
Contributed by Dimitri Block, Niels Hendrik Fliedner, Uwe Meier.
Measurement of the channel gain for multiple distances within a factory environment. There are two new tracesets in this version.
If you do use these data, please let us know, and you can use the DOI 10.15783/C76S3K to do so. BibTeX and RIS are provided on the website

Smartphones, mobile PCs, tablets and mobile routers with cellular connection



700 million mobile PCs, tablets and mobile router subscriptions

5.6 BILLION

smartphone subscriptions by the end of 2019

Mobile PCs, tablets and mobile router subscriptions

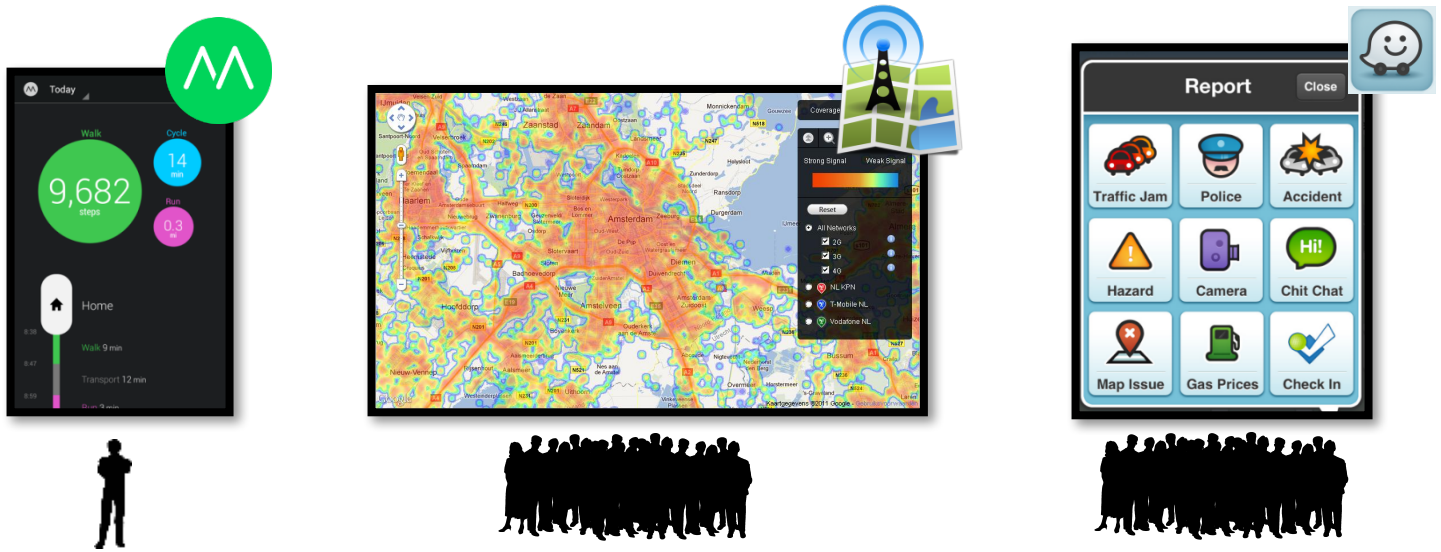
Smartphone subscriptions


Crowd & sensing
TEIKYO UNIVERSITY
ROAD TO NINJA
8.24
FOREVER
http://www.flickr.com/photos/40006794@N02/2572802/

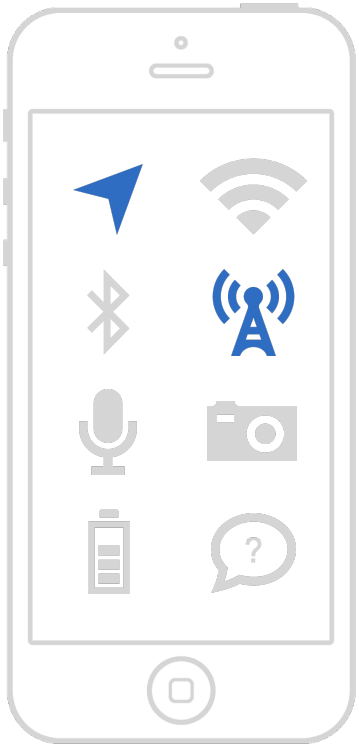
Crowd Sensing | kraʊdːsɛnsɪŋ |

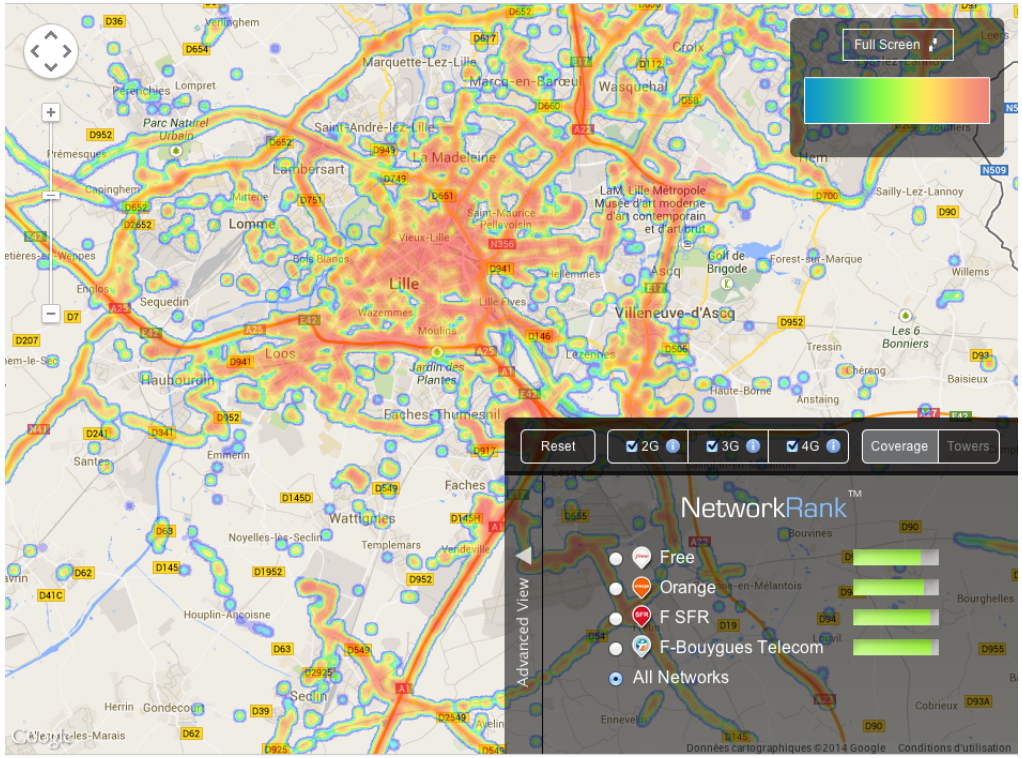
*«Capability of lifting a (large) diffuse **group of participants** to delegate the task of retrieving **trustable data** from the field. This includes:*

- **Participatory sensing** *involves the user in the sensing task (eg. surveys)*
- **Opportunistic sensing** *uses mobile sensors carried by the user (eg. Smartphones)»*



Applications to data visualisation



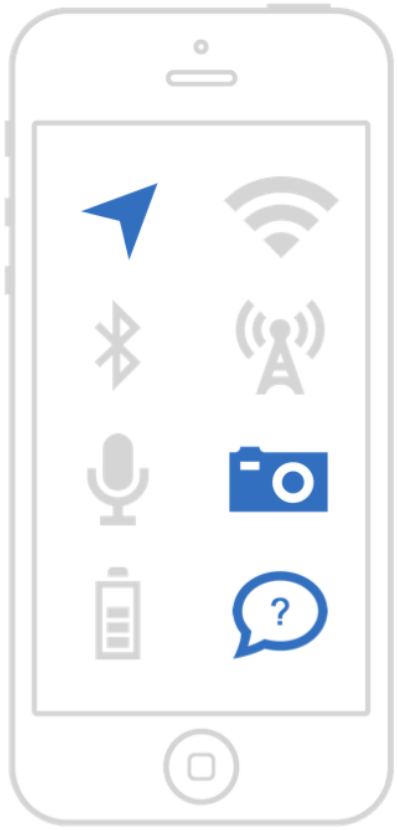


source: http://opensignal.com

Applications to IoT monitoring

source: http://goo.gl/xw8huo

Applications to crowdsourcing



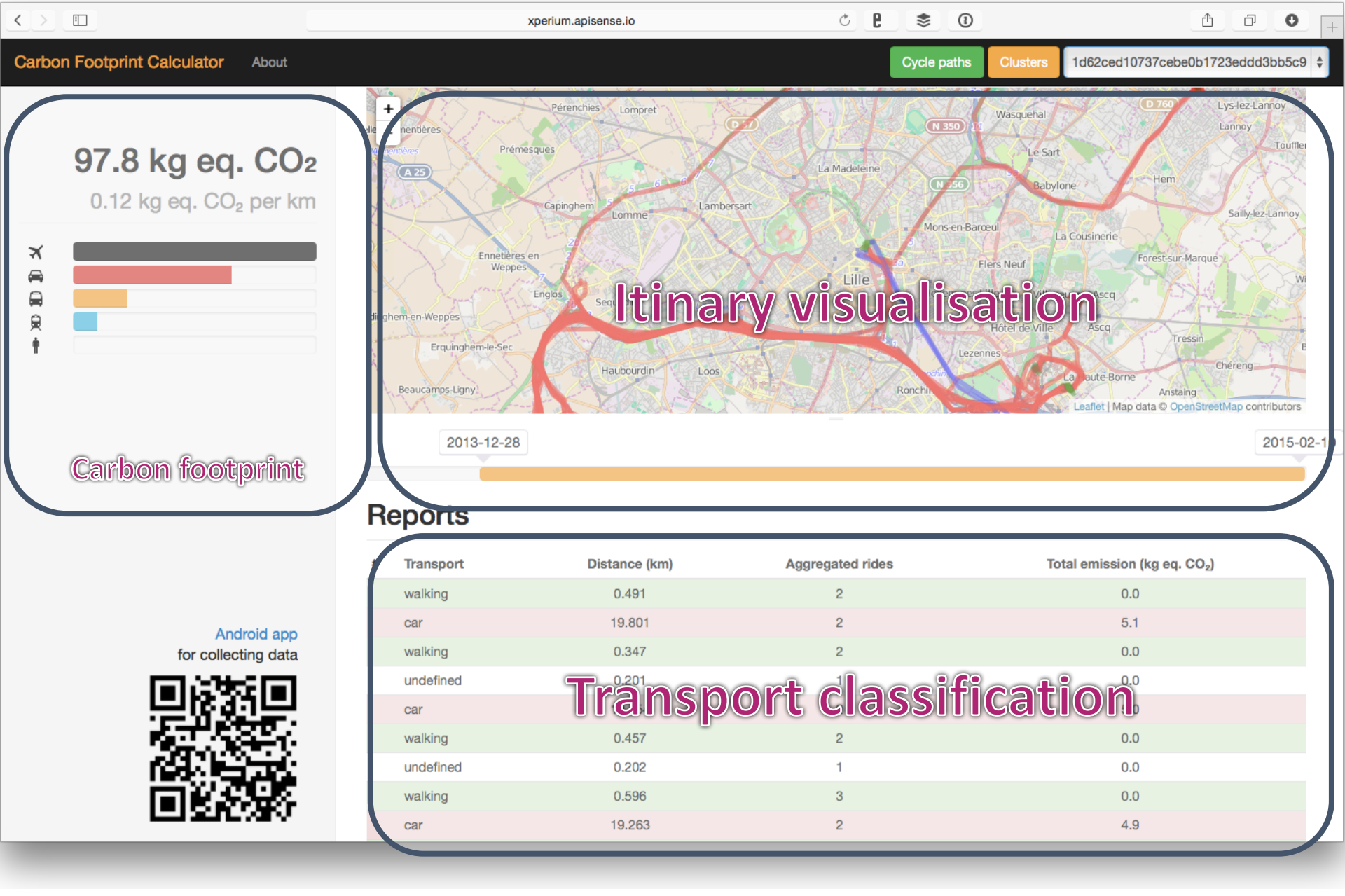
source: http://fr.clicandwalk.com

apisense

Mobile Crowd Sensing made easy!

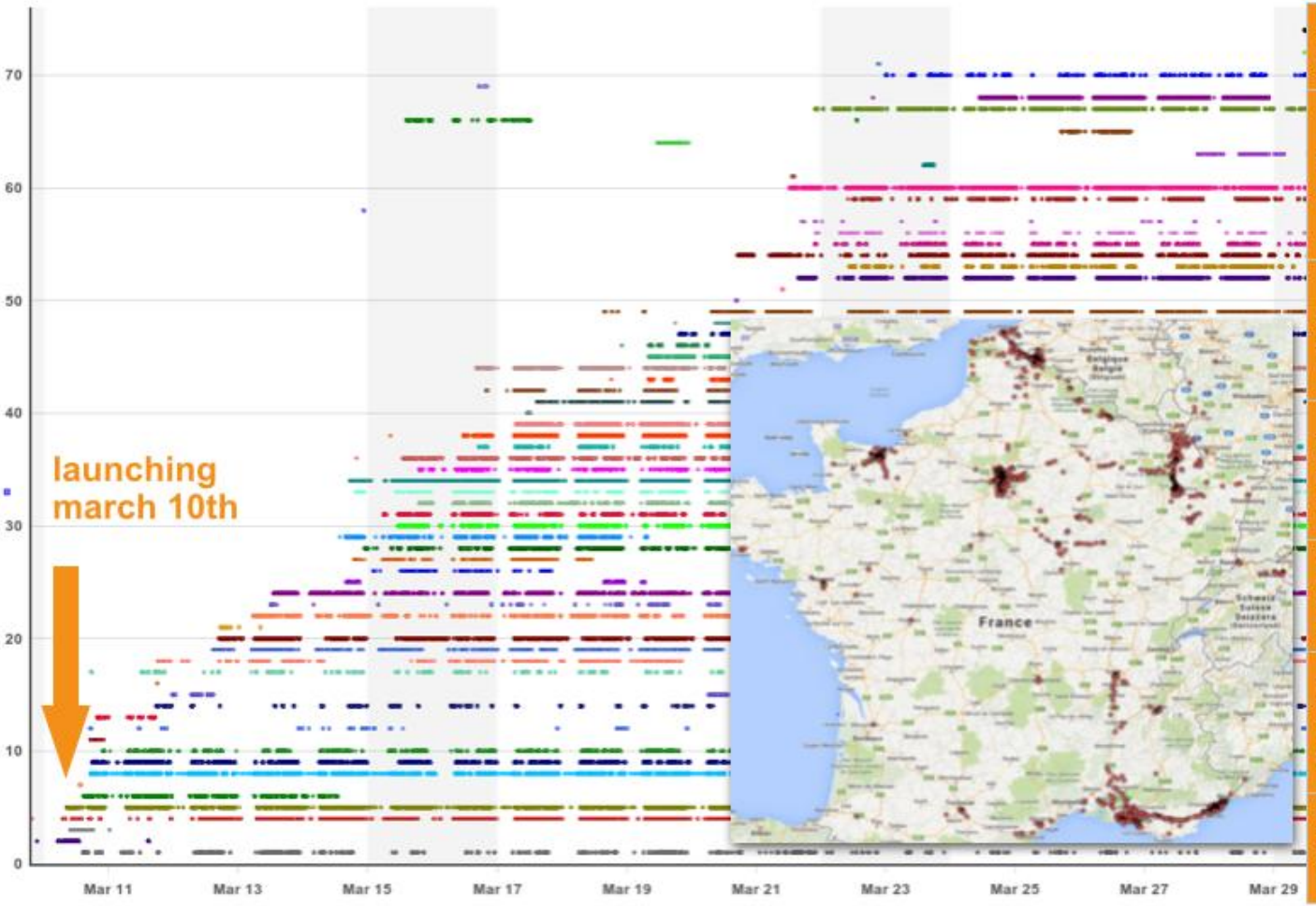
http://apisense.io

Xperium : Mobility Analysis



Transport	Distance (km)	Aggregated rides	Total emission (kg eq. CO_2)
walking	0.491	2	0.0
car	19.801	2	5.1
walking	0.347	2	0.0
undefined	0.201	1	0.0
car	[illegible]	[illegible]	[illegible]
walking	0.457	2	0.0
undefined	0.202	1	0.0
walking	0.596	3	0.0
car	19.263	2	4.9

PRACTIC : Human Analysis

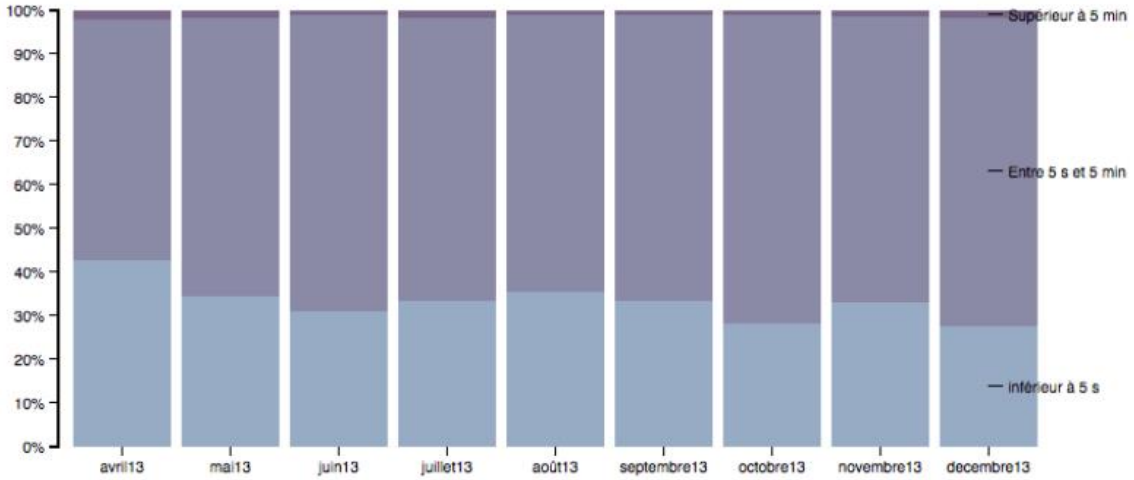


All Campaigns (except Caen)

112 371 of data	or 39 days of data per user (average)
97 volunteers	Of which : - 64 % male - 80 % age under 30 - 73 % single - 35% income < 1500€/m.
68 % of students	Of which : - 43% Computer Sc./ ingeneers - 22% Communication
14 device brands	Of which : - 41% Samsung - 24% LGE - 12%Sony
48 device models	Of which : - 12% LGE Nexus 5
13 telecom operators	Of which : - 77% Free, Orange, Bouygues and SFR; - 12% unknown
14 Androïd versions	Of which : 26% in 4.4.2

Frequency and duration of sessions on a smartphone and a tablet

(occurrences of the number of sessions according to 3 levels of duration)



Jeu de données d'un smartphone

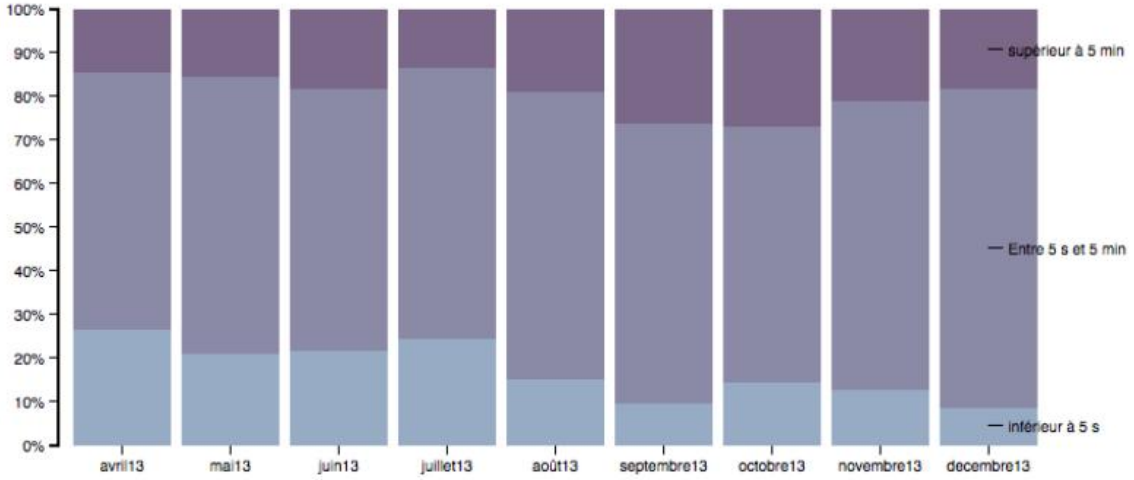
Première donnée le 19 avril 2013

- Avril : 2371 sessions sur 12 jours
- Mai : 3579 sessions sur 25 jours
- Juin : 1000 sessions sur 4 jours
- Juillet : 7090 sessions sur 31 jours
- Août : 5507 sessions sur 29 jours
- Septembre : 8304 sessions sur 30 jours
- Octobre : 8188 sessions sur 31 jours
- Novembre : 6287 sessions sur 30 jours
- Décembre : 4867 sessions sur 26 jours

Soit une présence de 218 jours sur 257 (84.82%) pour 47193 sessions

Moyenne par jour : 216.5 sessions

Ecart-type par jour : 89.03



Jeu de données d'une tablette

Première donnée le 11 avril 2013

- Avril : 561 sessions sur 16 jours
- Mai : 824 sessions sur 29 jours
- Juin : 513 sessions sur 27 jours
- Juillet : 688 sessions sur 25 jours
- Août : 449 sessions sur 24 jours
- Septembre : 387 sessions sur 29 jours
- Octobre : 288 sessions sur 27 jours
- Novembre : 338 sessions sur 21 jours
- Décembre : 218 sessions sur 26 jours

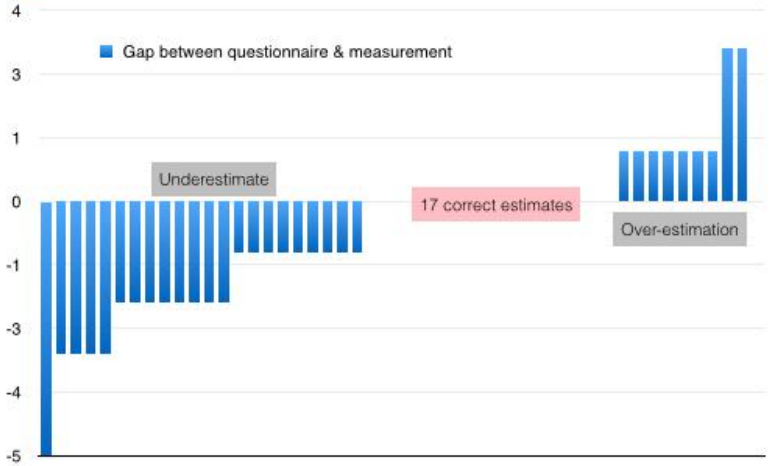
Soit une présence de 224 jours sur 265 (84.5%) pour 4266 sessions

Moyenne par jour : 19 sessions

Ecart-type par jour : 17.34

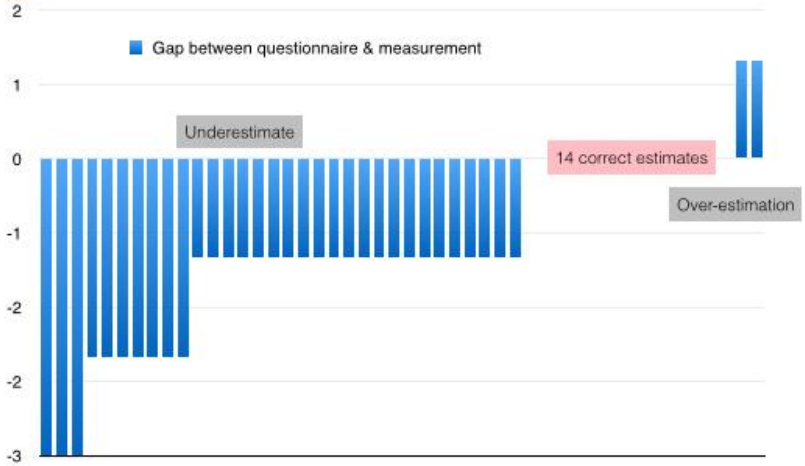
1

How much time per day do you use your smartphone?



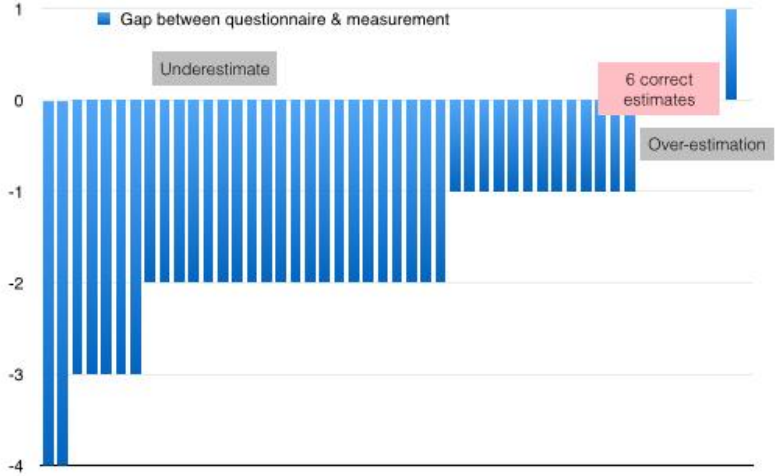
2

How many applications do you use daily?



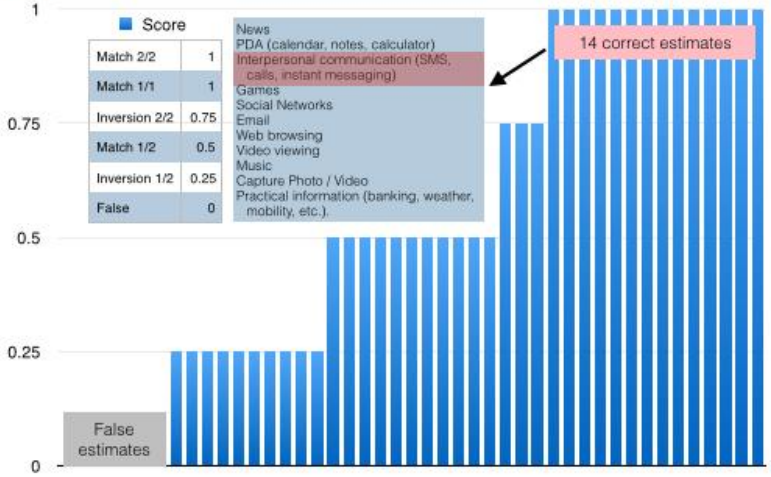
3

How many applications has your smartphone ?

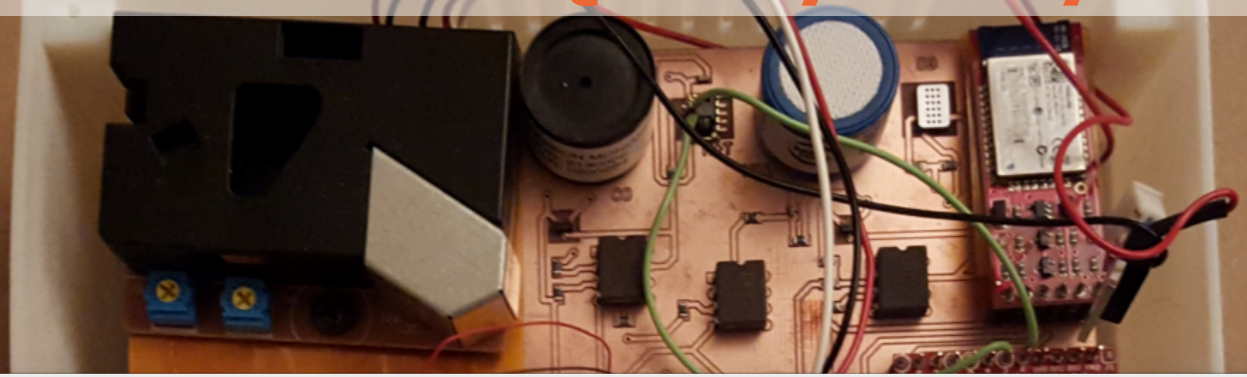


4

What are the first and second main uses of your smartphone?



OSCAR : Air Quality Analysis



apolline.lille.inria.fr

Apolline - Bureau 108

Zoom Out | Last 7 days | Refresh every 5s

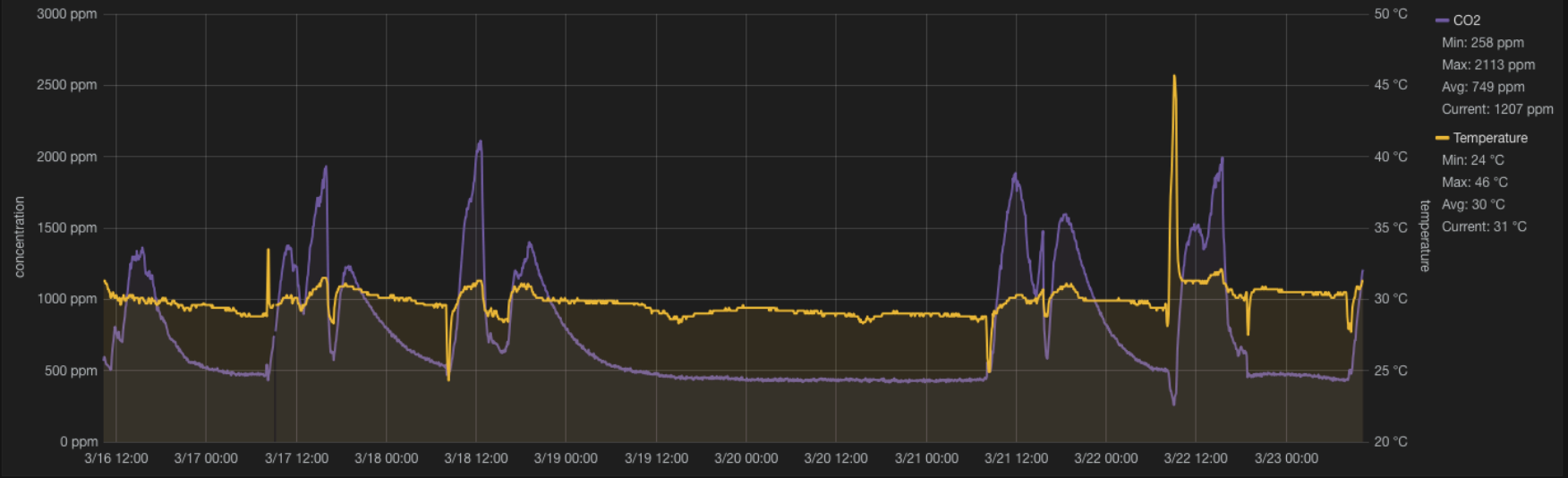
Concentration CO2

1207 ppm

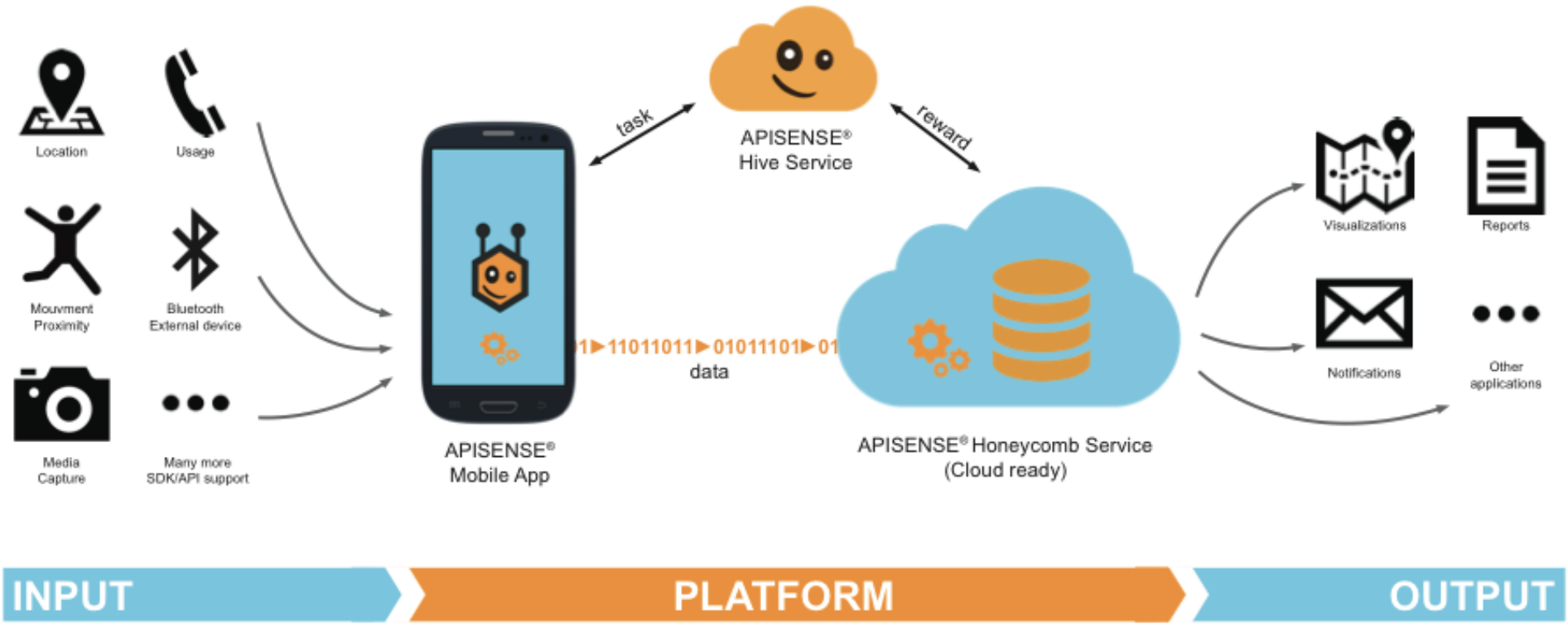
Temperature Sensor

31 °C

Bureau 108 PC2A



+ ADD ROW


Location
Usage
Mouvment
Proximity
Bluetooth
External device
Media
Capture
Many more
SDK/API support
APISENSE®
Mobile App
task
APISENSE®
Hive Service
reward
11011011
01011101
data
APISENSE® Honeycomb Service
(Cloud ready)
Visualizations
Reports
Notifications
Other
applications
INPUT
PLATFORM
OUTPUT


energy
privacy
human
security
incentives
smartphone
data
crowd
sensitization
network
awareness
Big Data
rewards
scalability
platform
ubiquitous
Android
transparency
activity
location
privacy
pervasive
cloud
sensing
feedback
participants
iOS
SaaS
GPS
ranking
signal
sensing
cloud
open
STB
mobile
log
prediction
physics
battery
noise
software
visualisation
recruitment
deployment
devices
energy
Windows~Phone
phone
governance
sensors
middleware
incentives
ubiquitous
transparency
scalability
rewards
activity
location
privacy
pervasive
cloud
sensing
feedback
participants
iOS
SaaS
GPS
ranking
signal
sensing
cloud
open
STB
mobile
log
prediction
physics
battery
noise
software
visualisation
recruitment
deployment
devices
energy
Windows~Phone
phone
governance
sensors
middleware
incentives

Data

Publish

Store

Process

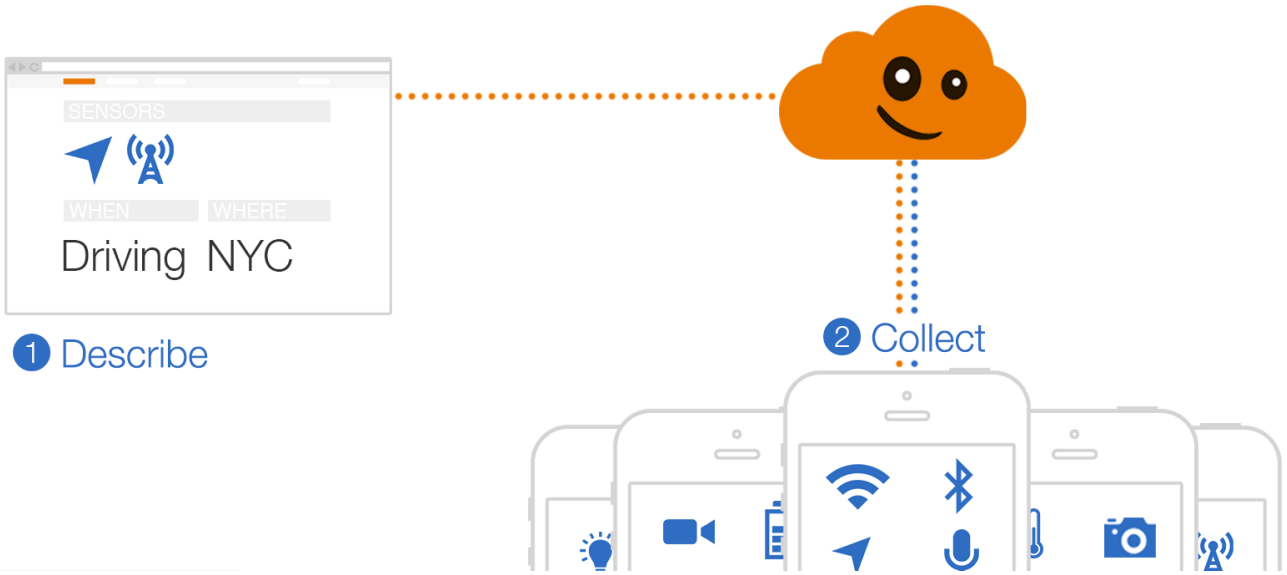
Code

Deploy

Sync.

How does it work?

How does it work?



Privacy & Energy

How does it work?

Privacy & Energy

play.google.com

Applications

Catégories | Accueil | Classements | Nouveautés

Mes applications

Acheter

Jeux

Famille

Choix de l'équipe

Compte

Mon activité Play

Ma liste de souhaits

Utiliser un code

Acheter une carte cadeau

Guide à l'usage des parents

Bee

APISENSE Outils

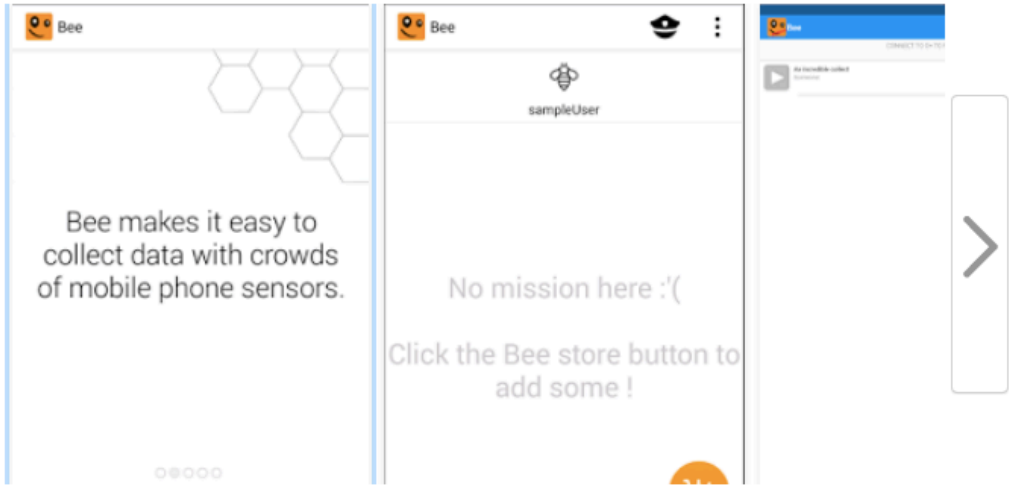
★★★★★ 3

PEGI 3

Vous ne disposez d'aucun appareil.

Ajouter à la liste de souhaits

Installer



Traduire la description en Français à l'aide de Google Traduction ?

Traduire

A crowdsensing solution.

Resources:

APISENSE Bee

Apps | My Apps | Updates | App Store

App Store > Utilities > Romain Rouvoy

APISENSE Bee 4+

Romain Rouvoy >

Get

This app is designed for both iPhone and iPad

Rating: 4+

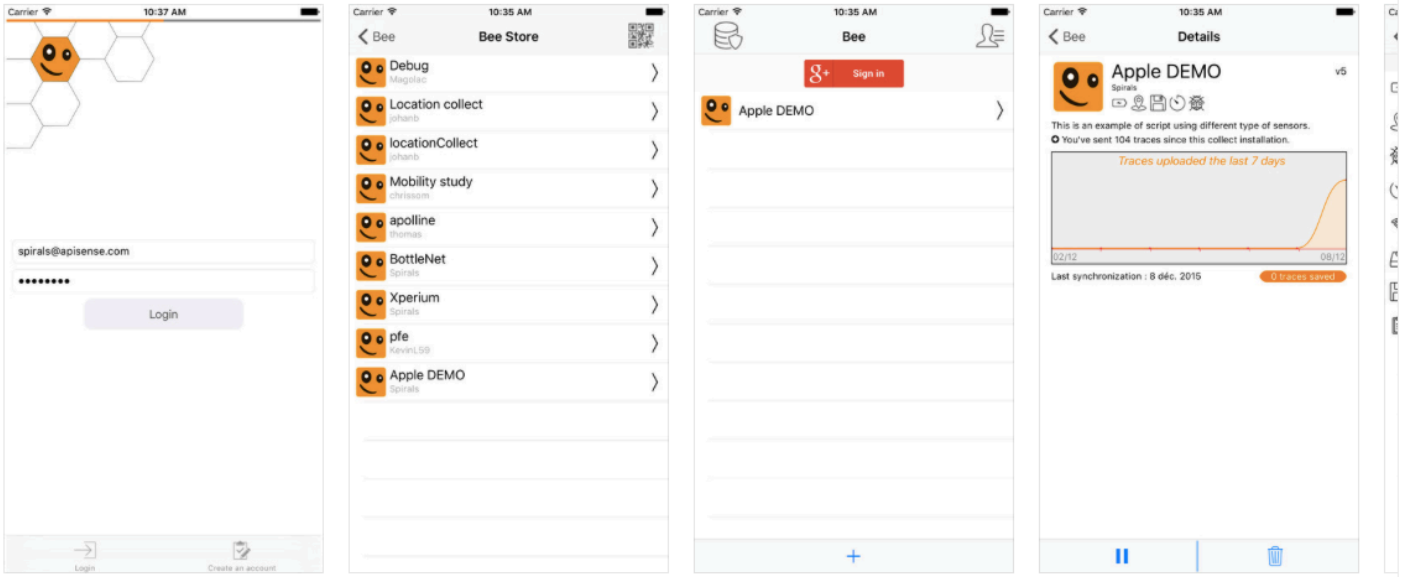
LINKS

Developer Website

Details | Ratings and Reviews | Related

Screenshots

iPhone | iPad



apisense.io

apisense

Documentation Feedback Contact

Collect data easily with crowds of mobile phone sensors. Make sense and innovate on top of real world data feedback, in real time!

Login

Register

Spirals

••••••••••

Login

Forgot password?

Tweets by @APISENSE

APISENSE
@APISENSE

KevinL59 just published a collect called data-airflow-test2 ! Contribute with Bee at onelink.to/beeapisense

19 Apr

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@APISENSE

KevinL59 just published a collect called data-mobility-test ! Contribute with Bee at onelink.to/beeapisense

14 Apr

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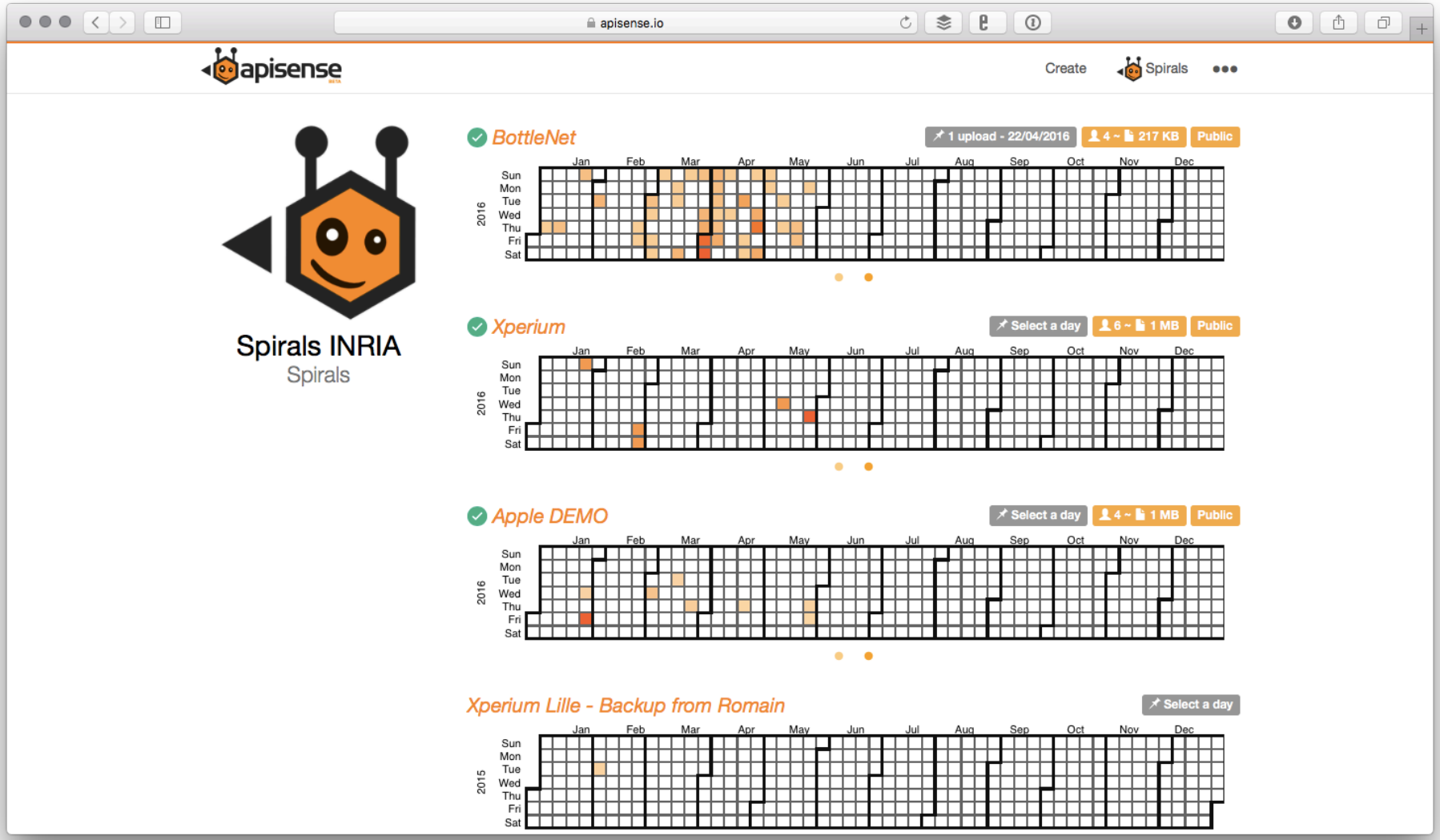
Embed View on Twitter

ANDROID APP ON Google Play

Download on the App Store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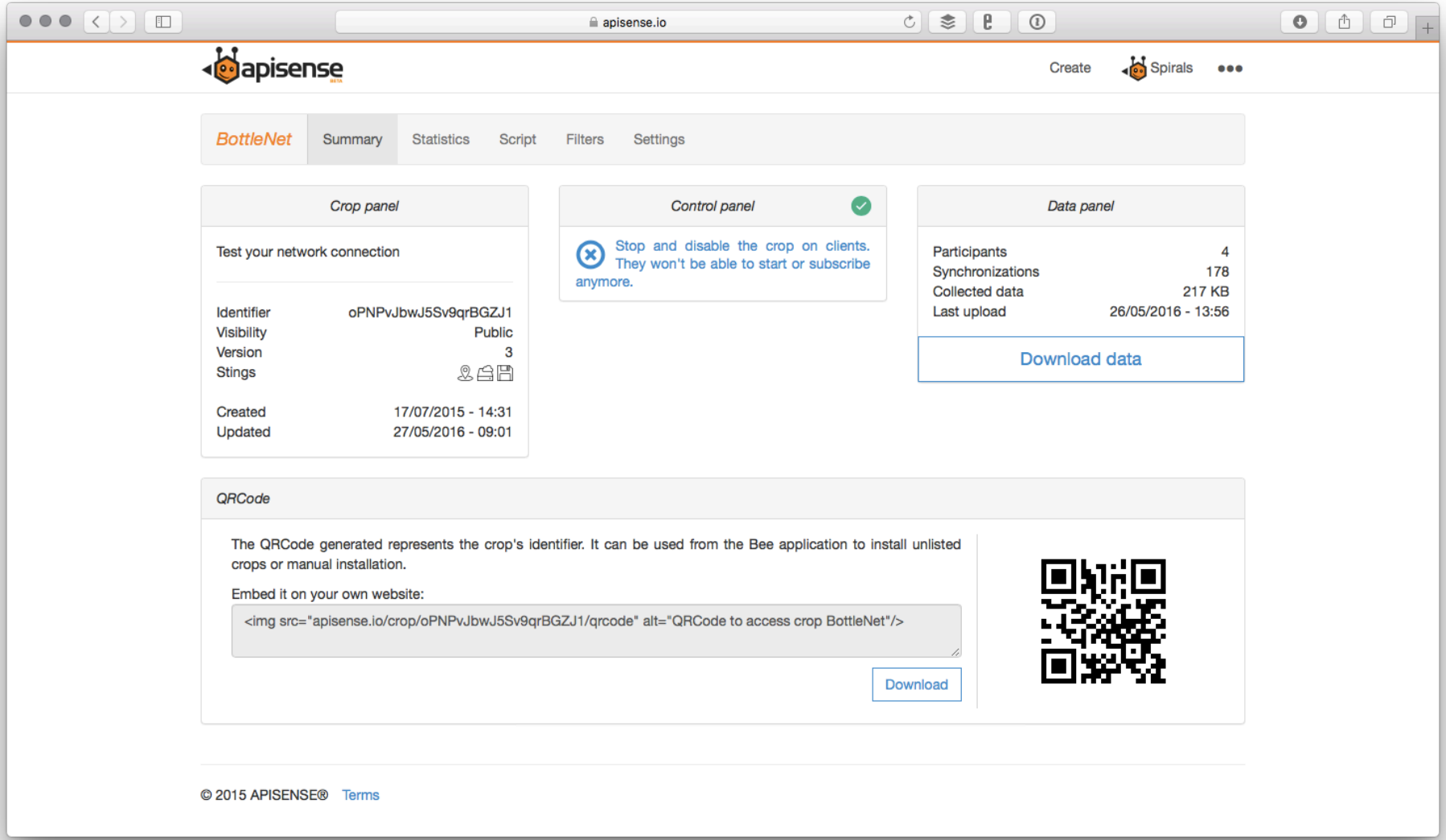
Create
Spirals
Spirals INRIA
Spirals
BottleNet
1 upload - 22/04/2016
4 ~ 217 KB
Public
Xperium
Select a day
6 ~ 1 MB
Public
Apple DEMO
Select a day
4 ~ 1 MB
Public
Xperium Lille - Backup from Romain
Select a day
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Sun Mon Tue Wed Thu Fri Sat
2016
2015


apisense.io
apisense
Create
Spirals
BottleNet
Summary
Statistics
Script
Filters
Settings
Crop panel
Test your network connection
Identifier oPNPvJbwJ5Sv9qrBGZJ1
Visibility Public
Version 3
Stings
Created 17/07/2015 - 14:31
Updated 27/05/2016 - 09:01
Control panel
Stop and disable the crop on clients. They won't be able to start or subscribe anymore.
Data panel
Participants 4
Synchronizations 178
Collected data 217 KB
Last upload 26/05/2016 - 13:56
Download data
QRCode
The QRCode generated represents the crop's identifier. It can be used from the Bee application to install unlisted crops or manual installation.
Embed it on your own website:

Download
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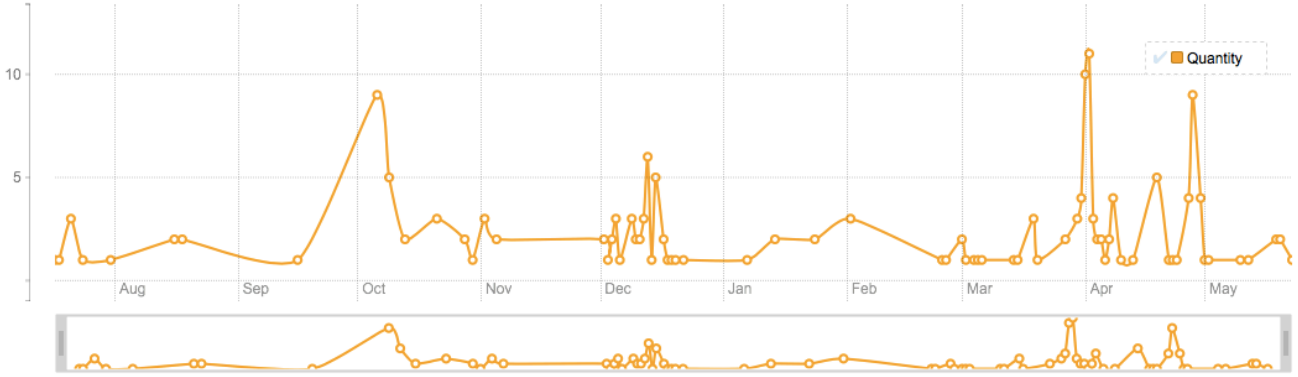
Create Spirals

BottleNet | Summary | Statistics | Script | Filters | Settings

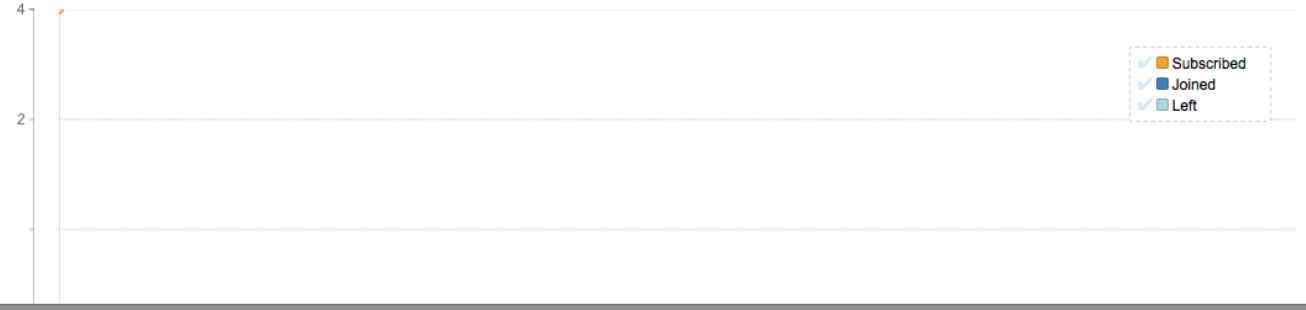
Collected data

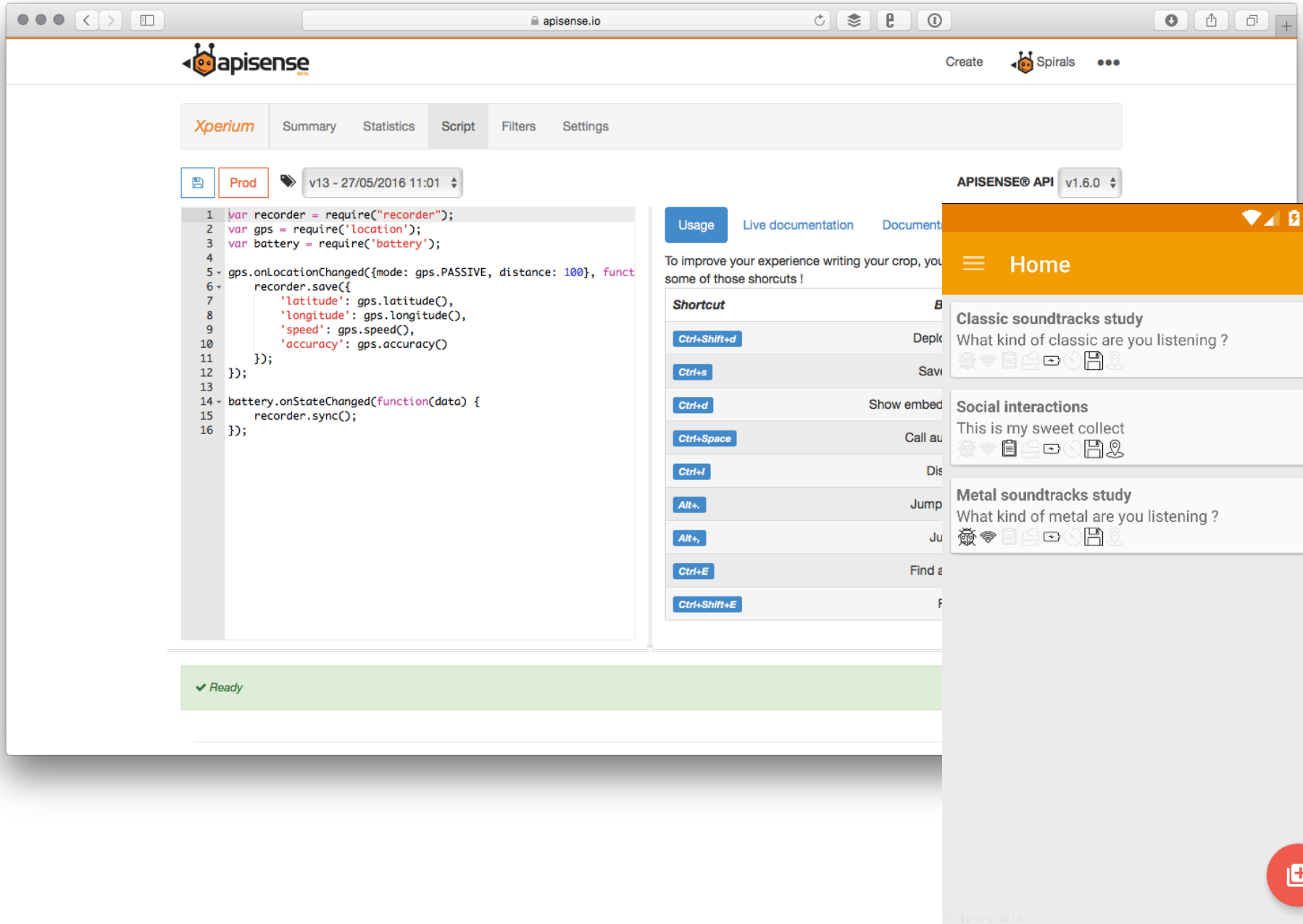
Updated 26/05/2016 - 13:56



Subscribers evolution

Updated 26/05/2016 - 15:28

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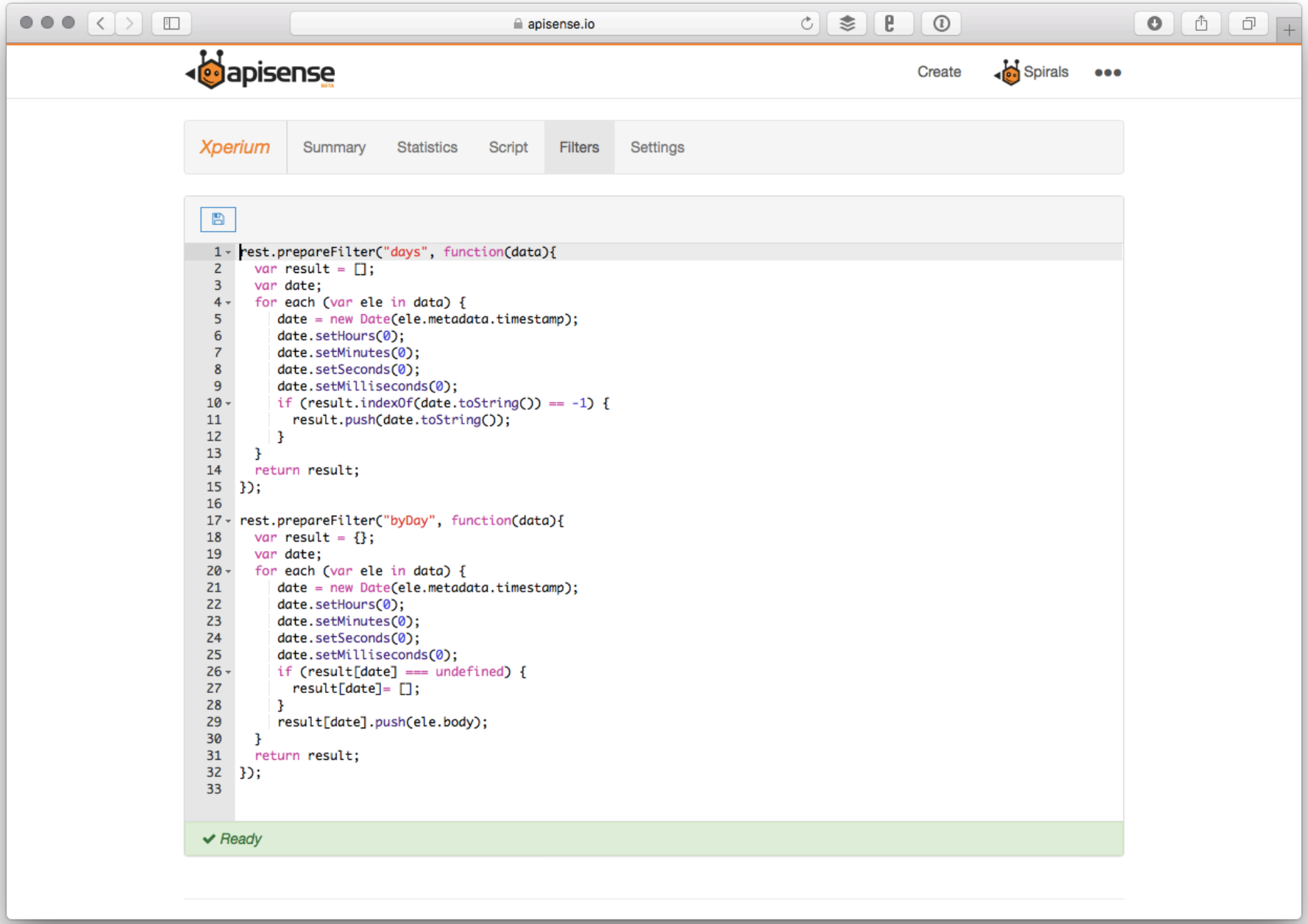
apisense
Create
Spirals
Xperium
Summary
Statistics
Script
Filters
Settings
Prod
v13 - 27/05/2016 11:01
APISENSE® API
v1.6.0
var recorder = require("recorder");
var gps = require('location');
var battery = require('battery');
gps.onLocationChanged({mode: gps.PASSIVE, distance: 100}, funct
recorder.save({
'latitude': gps.latitude(),
'longitude': gps.longitude(),
'speed': gps.speed(),
'accuracy': gps.accuracy()
});
});
battery.onStateChanged(function(data) {
recorder.sync();
});
Usage
Live documentation
To improve your experience writing your crop, you
some of those shorcuts !
Shortcut
Ctrl+Shift+d
Ctrl+s
Ctrl+d
Ctrl+Space
Ctrl+I
Alt+.
Alt+,
Ctrl+E
Ctrl+Shift+E
Ready
8:33
Home
Classic soundtracks study
What kind of classic are you listening ?
Social interactions
This is my sweet collect
Metal soundtracks study
What kind of metal are you listening ?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apisense
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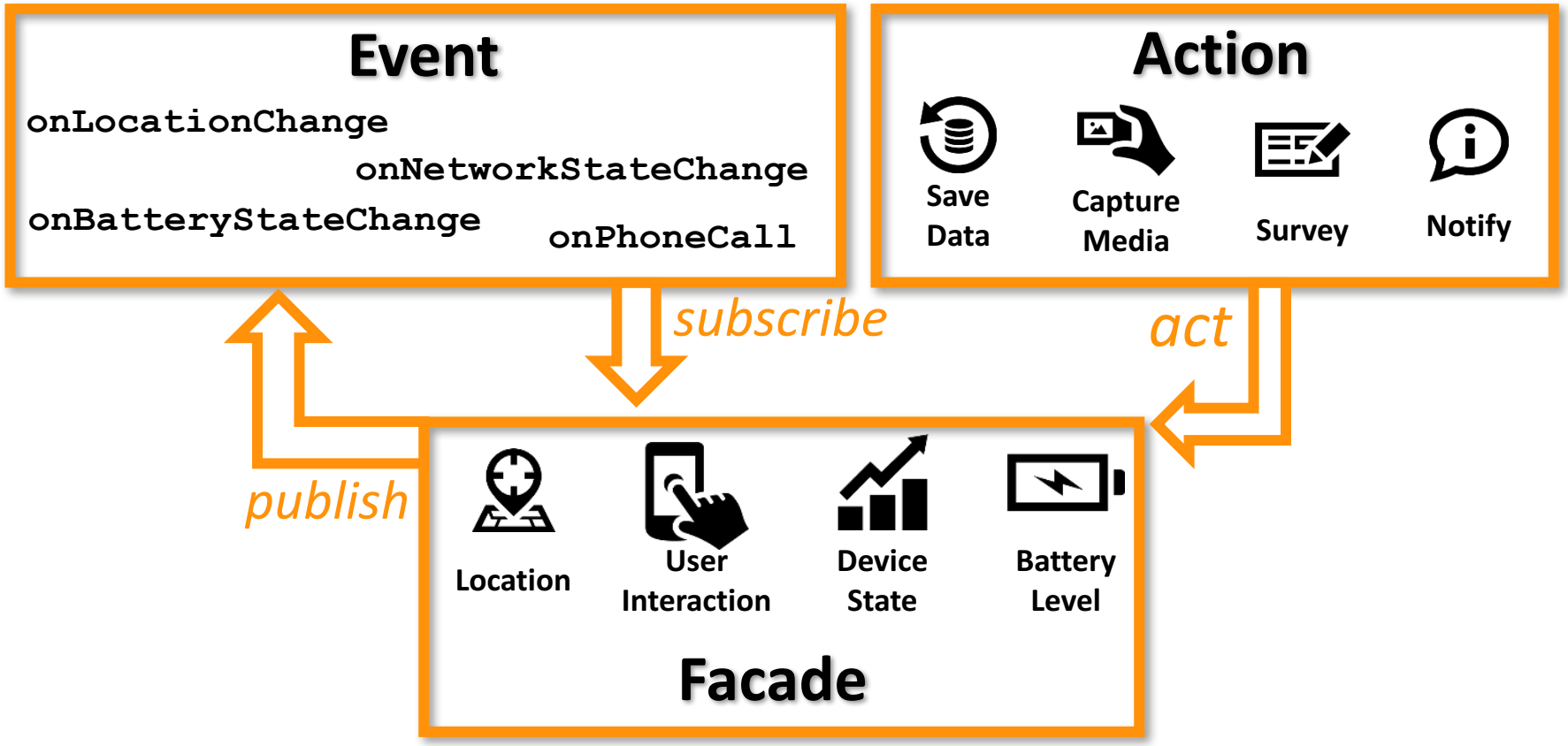
Spirals
Xperium
Summary
Statistics
Script
Filters
Settings
rest.prepareFilter("days", function(data){
var result = [];
var date;
for each (var ele in data) {
date = new Date(ele.metadata.timestamp);
date.setHours(0);
date.setMinutes(0);
date.setSeconds(0);
date.setMilliseconds(0);
if (result.indexOf(date.toString()) == -1) {
result.push(date.toString());
}
}
return result;
});
rest.prepareFilter("byDay", function(data){
var result = {};
var date;
for each (var ele in data) {
date = new Date(ele.metadata.timestamp);
date.setHours(0);
date.setMinutes(0);
date.setSeconds(0);
date.setMilliseconds(0);
if (result[date] === undefined) {
result[date]= [];
}
result[date].push(ele.body);
}
return result;
});
Ready

Device-level Sensing Task



Device-level Sensing Task

Façades

Event listener

Data upload

```
var location = requires('location');
var trace = requires('honeycomb');
var telephony = requires('gsm');

location.onLocationChange(function(event){

    trace.sync({
        lat : event.latitude,
        lng : event.longitude,
        signal : telephony.signalStrength()
    });
});
```

Crowd-scale Sensing Jobs

sense

```
sense(function( ) { … } )
```

---

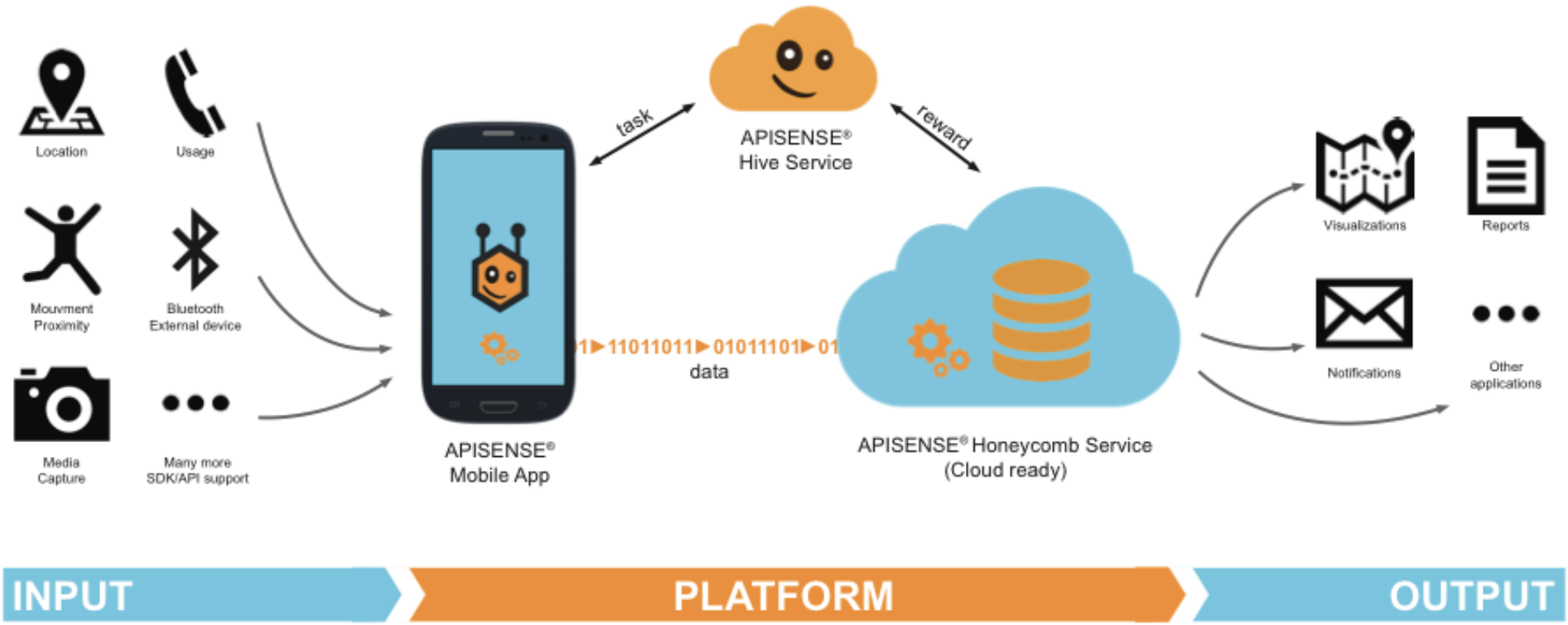
recruit

```
accept(function( ) {
   if (network.connectionType() == 'mobile')
      return {battery : battery.level()};
};

ranking(function(users){
   return users.sort('battery');
};
```

---

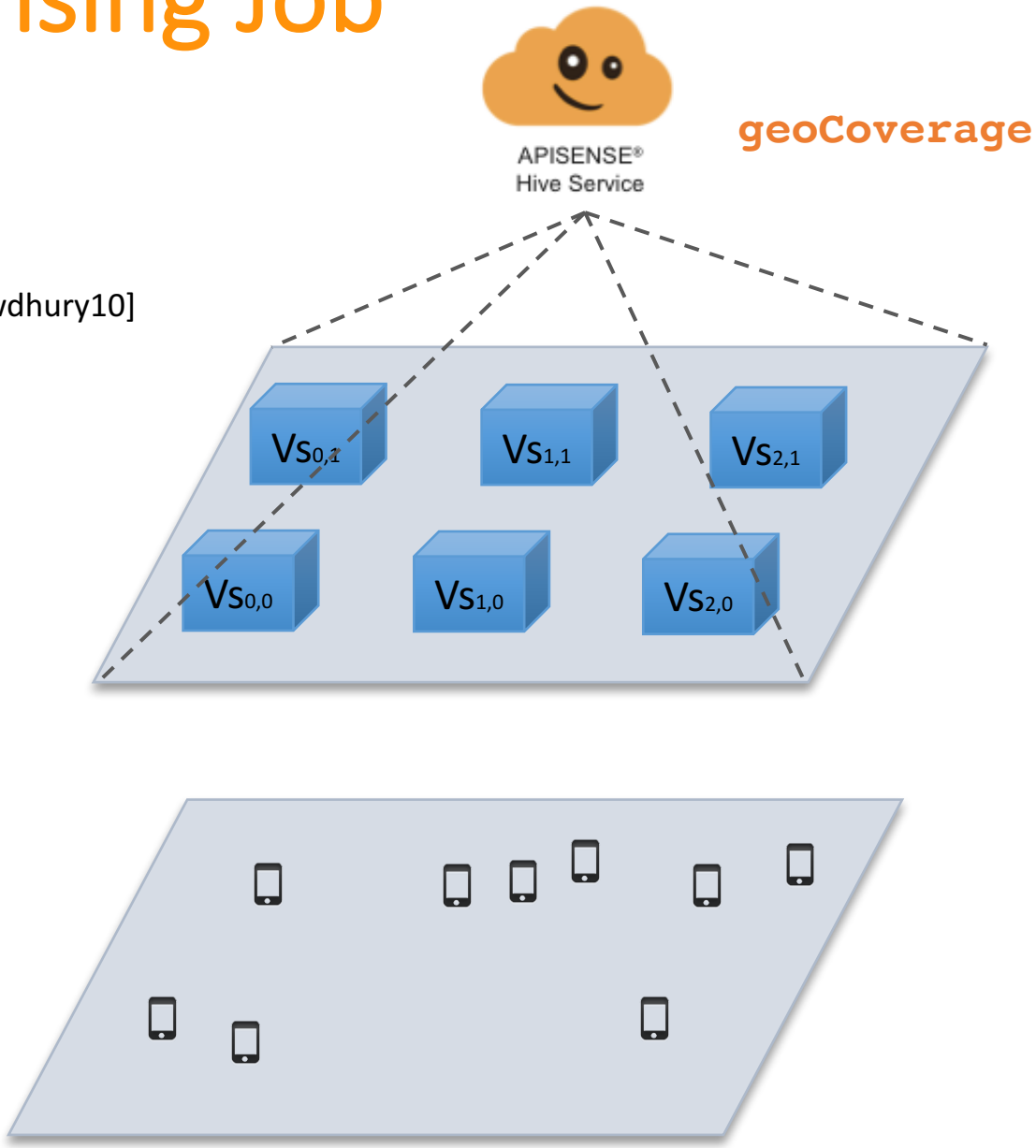
coverage

```
geoCoverage(
  [[50.614291,3.13282],[50.604159,3.15239]],
  '500 m');

timeCoverage('30 min','1 H');

duplicate(1);
```


Location
Usage
Mouvment
Proximity
Bluetooth
External device
Media
Capture
Many more
SDK/API support
APISENSE®
Mobile App
task
APISENSE®
Hive Service
reward
11011011
01011101
data
APISENSE® Honeycomb Service
(Cloud ready)
Visualizations
Reports
Notifications
Other
applications
INPUT
PLATFORM
OUTPUT

Crowd-scale Sensing Job

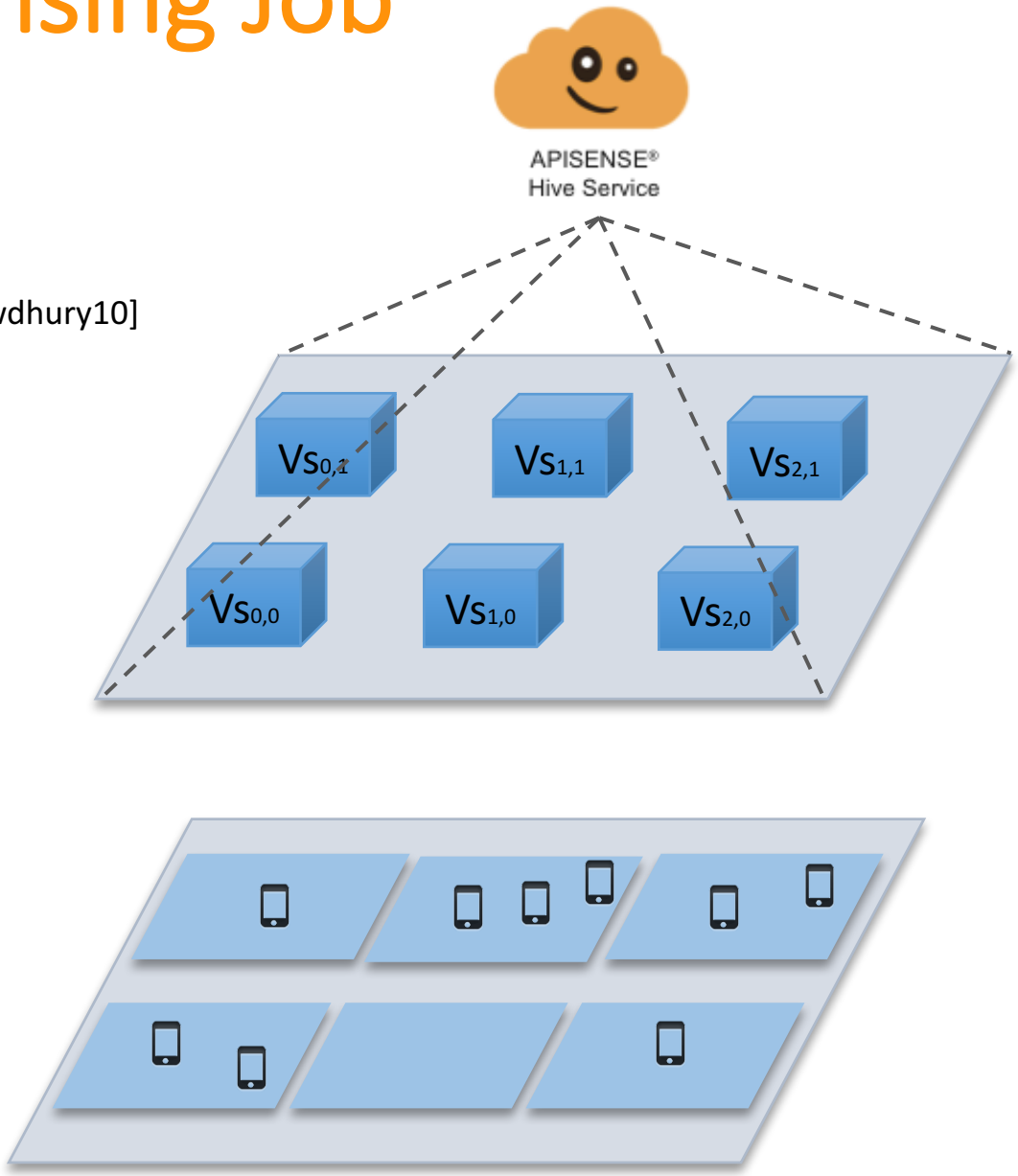
1. Virtual sensor deployment [Chowdhury10]



[Chowdhury10] **A survey of network virtualization**. *Computer Networks*. 2010

Crowd-scale Sensing Job

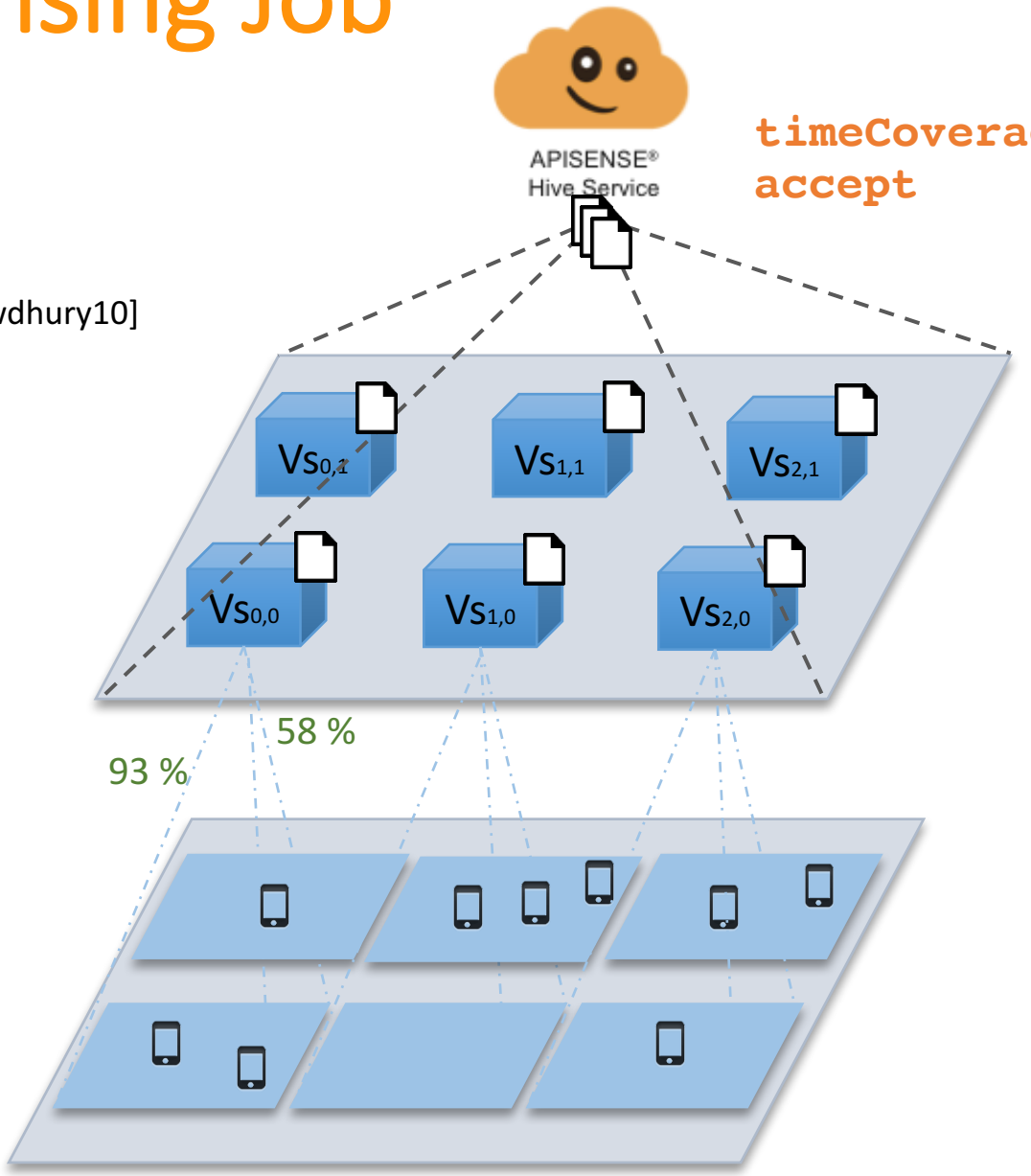
1. Virtual sensor deployment [Chowdhury10]
2. Connecting to physical devices



[Chowdhury10] **A survey of network virtualization**. *Computer Networks*. 2010

Crowd-scale Sensing Job

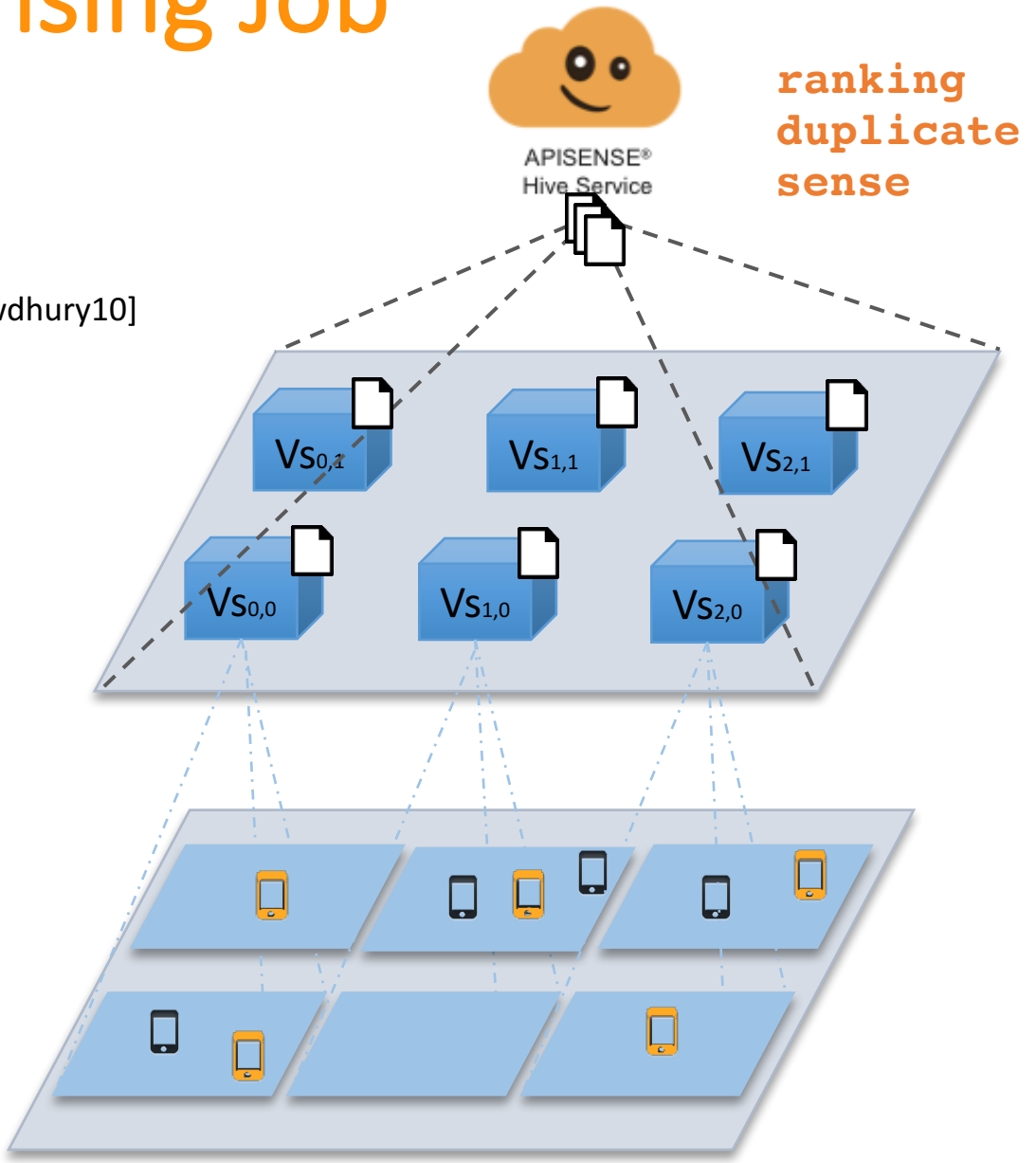
1. Virtual sensor deployment [Chowdhury10]
2. Connecting to physical devices
3. Assigning sensing tasks



[Chowdhury10] **A survey of network virtualization**. *Computer Networks*. 2010

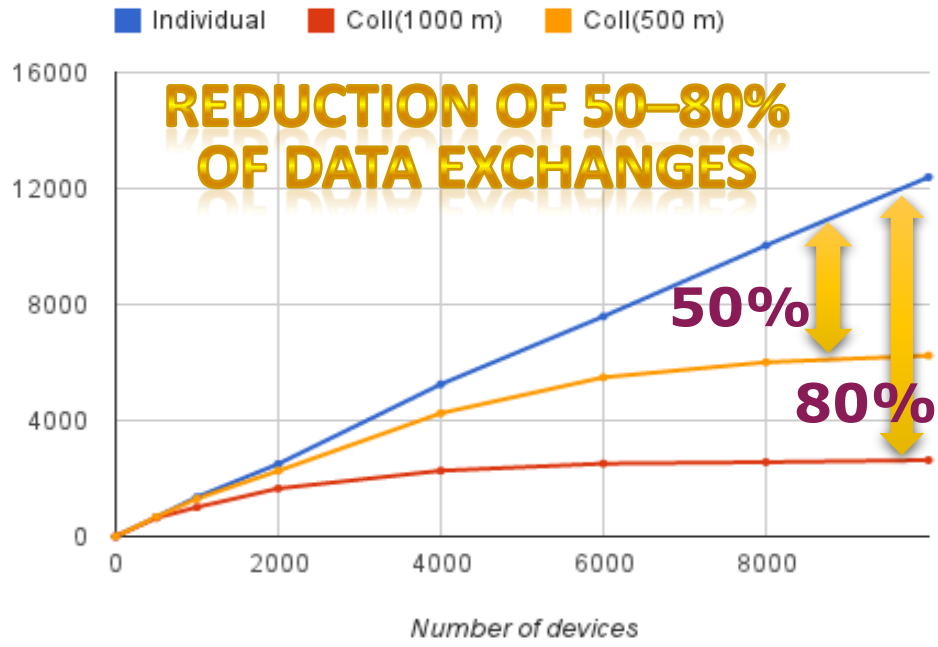
Crowd-scale Sensing Job

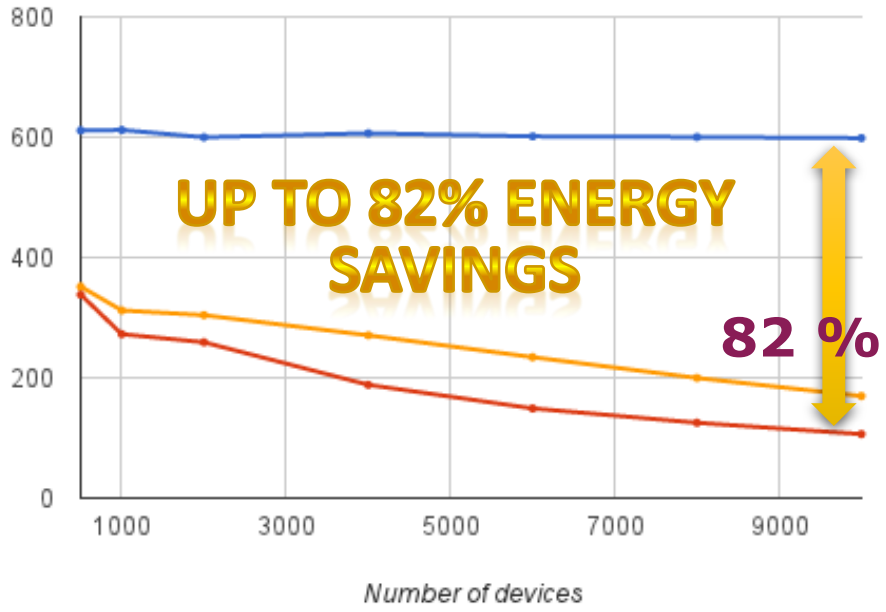
1. Virtual sensor deployment [Chowdhury10]
2. Connecting to physical devices
3. Assigning sensing tasks
4. Executing sensing tasks

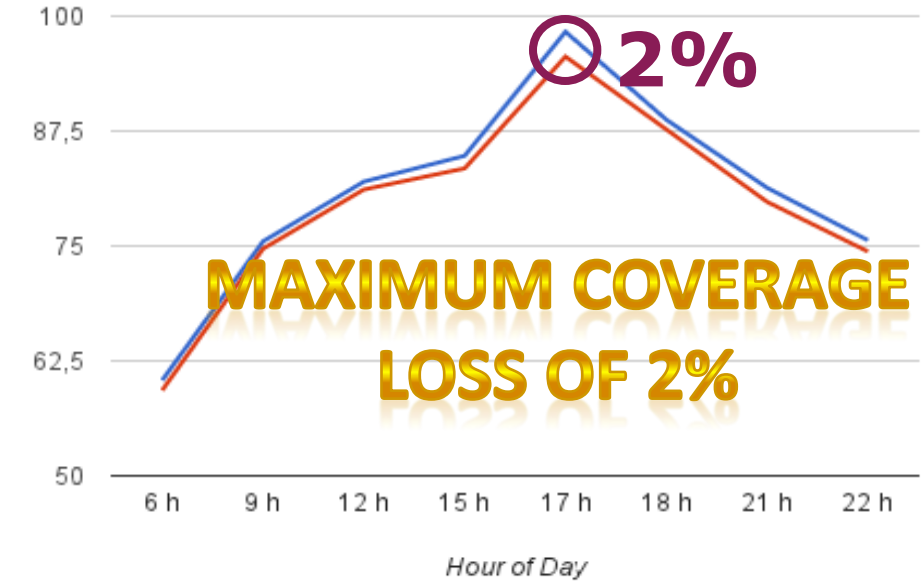


[Chowdhury10] **A survey of network virtualization**. *Computer Networks*. 2010

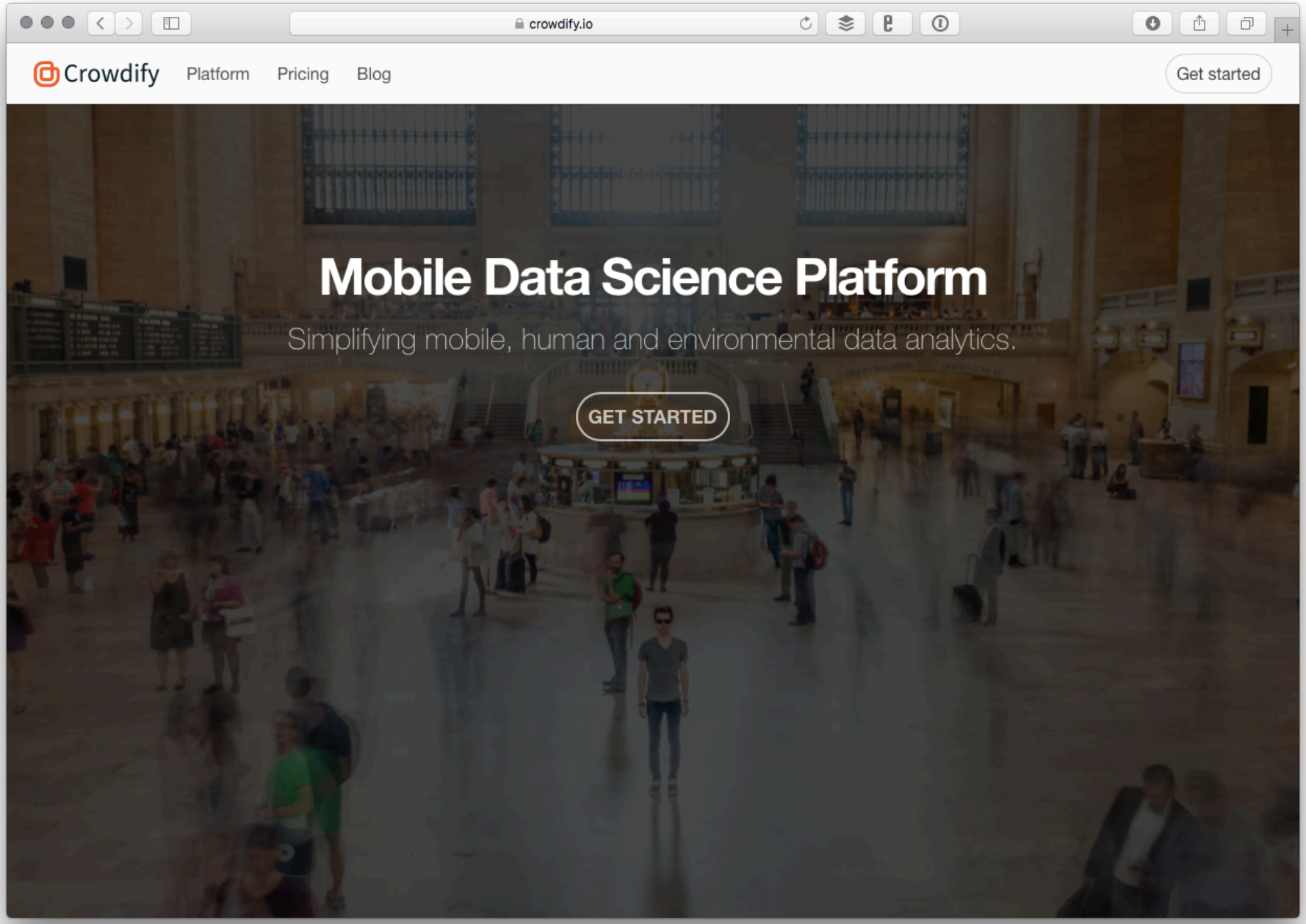
Evaluation of APISENSE®







	W/B-Scanner opportunist	Citizen journalist participative
APISENSE®	**4**	**9**
Anonysense	5	N/A
Pogo	4	N/A
MyExperience	N/A	27
Medusa	N/A	45
PRISM	??	330


crowdify.io
Crowdify
Platform
Pricing
Blog
Get started
Mobile Data Science Platform
Simplifying mobile, human and environmental data analytics.
GET STARTED

Book chapters

A Cloud-based Infrastructure for Crowdsourcing Data from Mobile Devices. N. Haderer, F. Paraiso, C. Ribeiro, P. Merle, R. Rouvoy, L. Seinturier. Cloud-based Software Crowdsourcing, Springer, 2014

Workshops

A preliminary investigation of user incentives to leverage crowdsensing activities. N.Haderer, R. Rouvoy and L. Seinturier. 2nd International IEEE PerCom Workshop on Hot Topics in Pervasive Computing (PerHot) (2013), pp. 199-204.

Towards Multi-Cloud Configurations Using Feature Models and Ontologies. C. Quinton, N. Haderer, R. Rouvoy and L. Duchien. 1st International Workshop on Multi-Cloud Applications and Federated Clouds (Multi-Cloud'13). April 2013, pp. 21-26.

Conferences

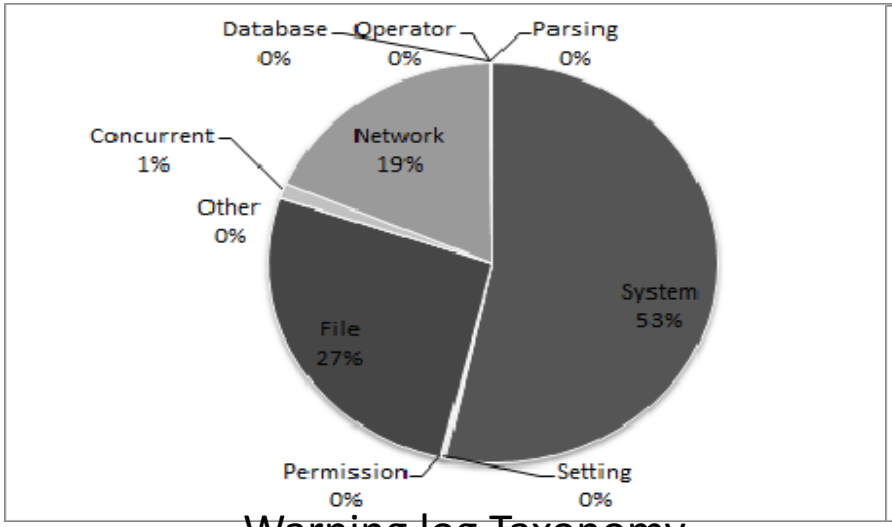
Dynamic Deployment of Sensing Experiments in the Wild Using Smartphones. N. Haderer, R. Rouvoy and L. Seinturier. 13th International IFIP 16 Conference on Distributed Applications and Interoperable Systems (DAIS), pages 43-56.

A Federated Multi-Cloud PaaS Infrastructure. Fawaz Paraiso, Nicolas Haderer, Phi- lippe Merle, Romain Rouvoy, Lionel Seinturier. In 5th IEEE International Conference on Cloud Computing (2012), pages 392-399.

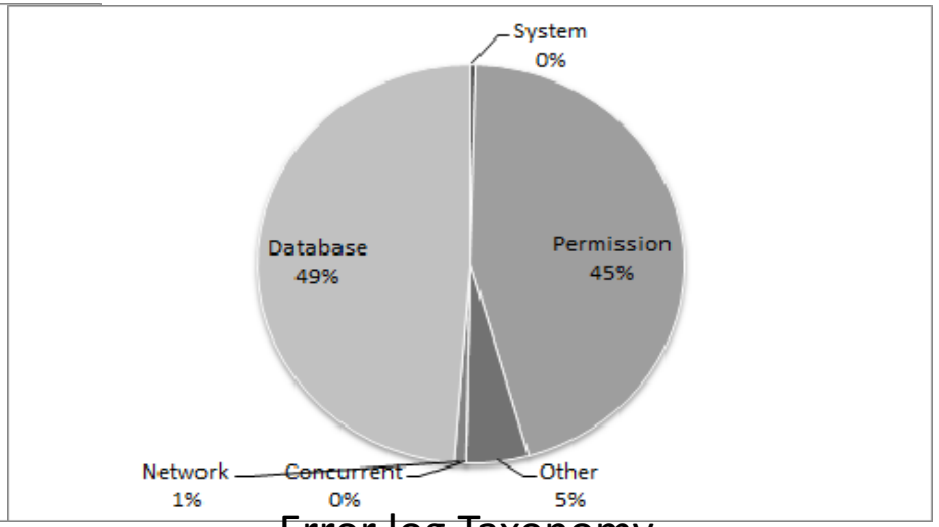
Dissemination

APISENSE : Crowd-Sensing Made Easy. Nicolas Haderer, Romain Rouvoy, Christophe Ribeiro, Lionel Seinturier. ERCIM News, ERCIM, 2013, Special theme : Mobile Computing, 93, pp. 28-29.

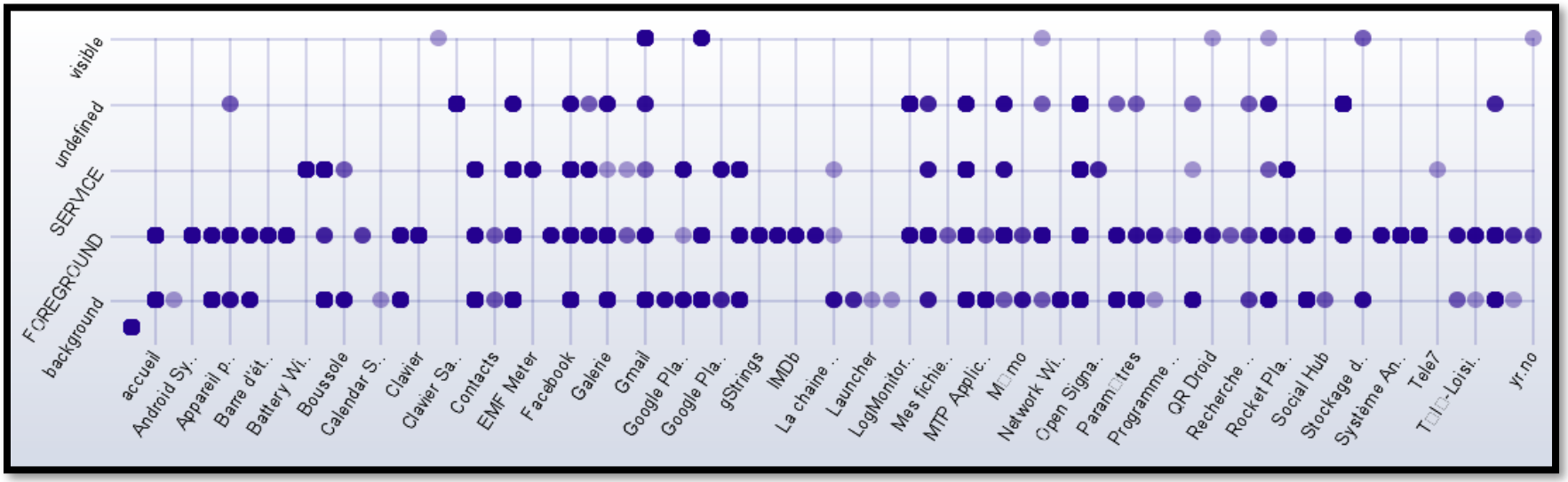
Collecting exception in the wild



Warning log Taxonomy



Error log Taxonomy



Assessing Machine Learning Models

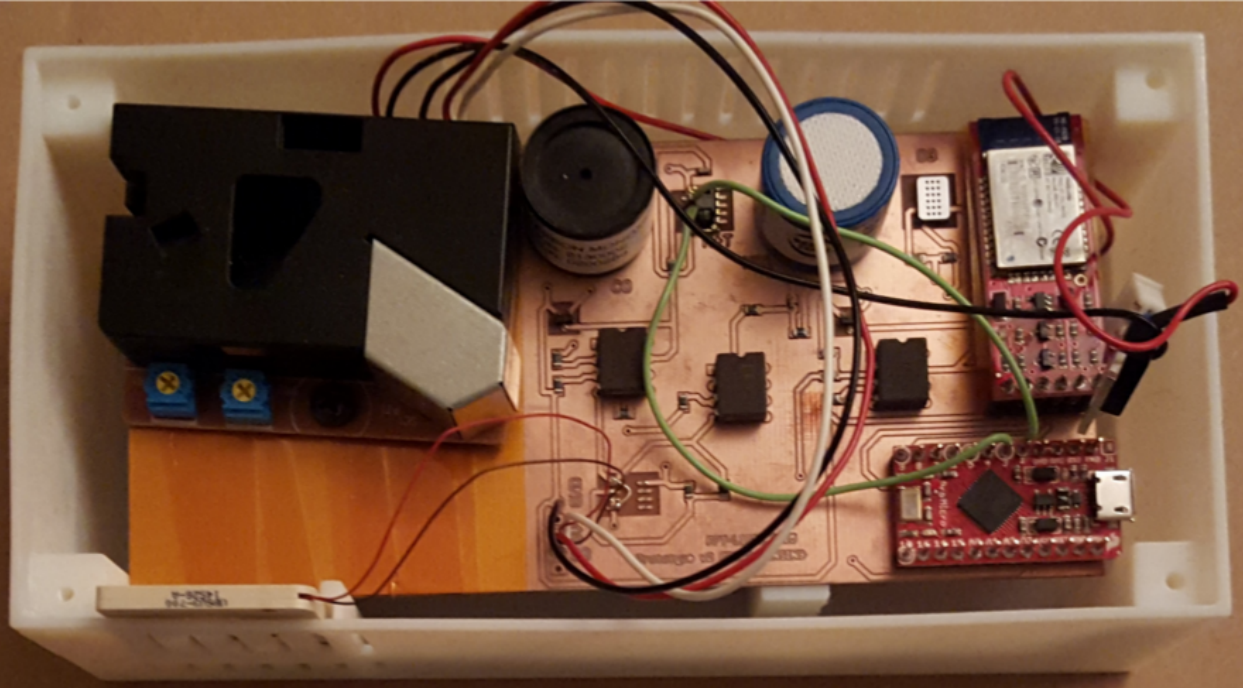
- User context recognition implementation : ~ 30 lines

```
…
accelerometer.onChange(function(acc) { buffer.push(acc) });
// Learning phase
dialog.display({ message: "Select movement", spinner: classes },function(pattern){
  accelerometer.onChange(function(acc) { buffer.push(acc) });
  sleep('5s')
  model.record(attributes(buffer), pattern);
  buffer = new Array();
  return;
});
…
// Exploitation phase
time.schedule({ period: '5s' }, function() {
  trace.add({
      position: model.evaluate(attributes(buffer)),
     stats: model.statistics() });
     buffer = new Array();
} } });
```

	Predicted class						Acc (%)
	Walk	Jog	Stand	Sit	Up	Down	
Walk	**66**	0	4	0	0	0	94,3
Jog	0	**21**	0	0	0	0	100
Stand	4	0	**40**	0	0	0	90,9
Sit	0	0	2	**83**	0	0	97,6
Up stair	0	0	0	0	**22**	0	100
Down stair	0	0	0	0	0	**11**	100

Representative Confusion Matrix

Incentive : the model of a free service between *Quantified-self* and *Mydata*



Programmer un module Arduino

```
#include "Sensor.h"
#include "Module.h"
#include "Channel.h"

Channel* mlog = new LogChannel();
Sensor* sensorTmp = new Sensor(A0, "temperature", &convertTemperature);
Sensor* sensorLum = new Sensor(A2, "Lumiere", &convertLumiere);
Module* myModule = new Module();

void setup() {
    Serial.begin(9600);
}

void loop() {
    myModule->load(sensorTmp);
    myModule->load(sensorLum);
    myModule->setChannel(mlog);
    myModule->updateM();
    delay(300000);
}
```

```
int convertTemperature(int sensorTmpVal){
  float voltage = (sensorTmpVal/1024.0) * 5.0;
  float temperature = (voltage - .5) * 100;
  return temperature;
}
```